SAVING ENERGY
Student & Family Guide

NEED
2009-2010
Putting Energy into Education

NEED Project PO Box 10101 Manassas, VA 20108 1-800-875-5029 www.NEED.org

Message to the Family

Dear Family Members:

The NEED Project's ***Saving Energy*** program provides teachers with curriculum materials that assist them in meeting energy science curriculum standards. With this program, students learn how energy is produced and used. They also learn ways to conserve energy that can easily be applied in their own homes.

Your child is a student participating in this ***Saving Energy*** program. To demonstrate how the energy conservation lessons your child is studying in class can be applied at home, you will be provided with a **Home Energy Efficiency Kit** containing several items designed to help reduce electricity and natural gas use in your home. Once installed, these energy conservation measures give families the opportunity to see how low-cost and no-cost measures can make a substantial difference in lowering energy use.

Your child's **Student and Family Guide** includes a questionnaire and we encourage you to work with your child to answer the questions. It is fine if you don't know all the answers. You and your child will learn about the different energy saving measures together.

This Student and Family Guide will allow your child to do additional research on your home's energy use that will show that your efforts to save energy do make a difference.

We are pleased you will be participating in this worthwhile activity and encourage you to contact your child's teacher or the NEED Project with any questions you may have.

Thanks for being an Energy Saver!

NEED

Putting Energy into Education

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FORMS OF ENERGY 1

All forms of energy fall under two categories

POTENTIAL

Potential energy is stored energy and the energy of position (gravitational).

CHEMICAL ENERGY

Chemical energy is the energy stored in the bonds of atoms and molecules. Biomass, petroleum, natural gas, propane and coal are examples of stored chemical energy.

NUCLEAR ENERGY

Nuclear energy is the energy stored in the nucleus of an atom—the energy that holds the nucleus together. The nucleus of a uranium atom is an example of nuclear energy.

STORED MECHANICAL ENERGY

Stored mechanical energy is energy stored in objects by the application of a force. Compressed springs and stretched rubber bands are examples of stored mechanical energy.

GRAVITATIONAL ENERGY

Gravitational energy is the energy of place or position. Water in a reservoir behind a hydropower dam is an example of gravitational potential energy. When the water is released to spin the turbines, it becomes motion energy.

KINETIC

Kinetic energy is motion– the motion of waves, electrons, atoms, molecules and substances.

RADIANT ENERGY

Radiant energy is electromagnetic energy that travels in transverse waves. Radiant energy includes visible light, x-rays, gamma rays and radio waves. Solar energy is an example of radiant energy.

THERMAL ENERGY

Thermal energy (or heat) is the internal energy in substances—the vibration and movement of atoms and molecules within substances. Geothermal energy is an example of thermal energy.

MOTION

The movement of objects or substances from one place to another is motion. Wind and hydropower are examples of motion.

SOUND

Sound is the movement of energy through substances in longitudinal (compression/ rarefaction) waves.

ELECTRICAL ENERGY

Electrical energy is the movement of electrons. Lightning and electricity are examples of electrical energy.

ENERGY SOURCE MATCHING 1

Write the number of the energy source on the line next to its definition.

1. PETROLEUM	_____	Black rock burned to make electricity.
2. WIND	_____	Energy from heat inside the earth.
3. BIOMASS	_____	Energy from flowing water.
4. URANIUM	_____	Energy from wood, waste and garbage.
5. PROPANE	_____	Energy from moving air.
6. SOLAR	_____	Energy from splitting atoms.
7. GEOTHERMAL	_____	Portable fossil fuel used in grills.
8. HYDROPOWER	_____	Fossil fuel for cars, trucks, and jets.
9. COAL	_____	Fossil fuel gas moved by pipeline.
10. NATURAL GAS	_____	Energy in rays from the sun.

FORMS & SOURCES 1

The energy we use in the U.S. is mainly provided by the following sources of energy. Write the form of energy—in what form the energy is stored or delivered—for each of the sources on the line to the right.

RENEWABLES

Biomass _____

Hydropower _____

Geothermal _____

Wind _____

Solar & Other _____

NONRENEWABLES

Petroleum _____

Natural Gas _____

Coal _____

Uranium _____

Propane _____

What percentage of U.S. energy is provided by each form of energy? By renewables? Nonrenewables?

Motion _____

Chemical _____

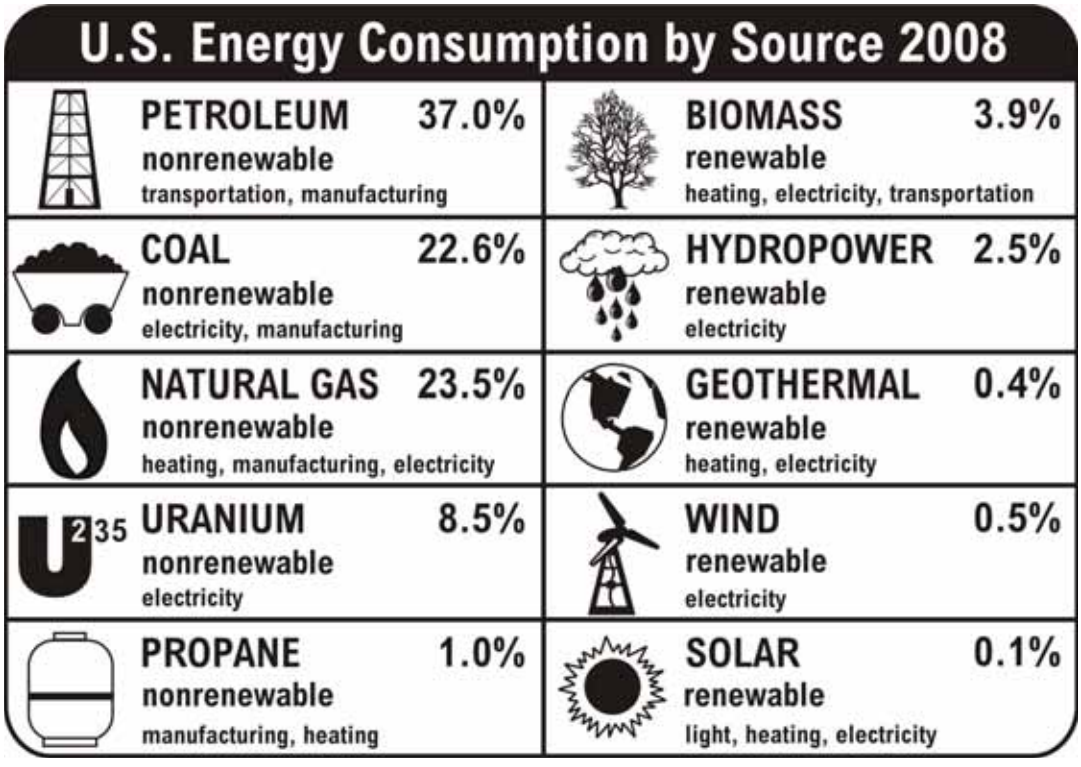
Radiant _____

Thermal _____

Nuclear _____

Renewables _____

Nonrenewables _____



THE ENERGY I USED TODAY 1

Circle the things you used or did in the left column. When you've completed the list, your teacher will show you how many Energy Bucks each activity or device uses. Write those numbers in the right column, then add them together to get your Total Energy Bucks used.

What energy woke me up this morning?	**ENERGY BUCKS**
Alarm Clock or Radio	_____
What energy was used to make my breakfast?	
Microwave	_____
Stove/Oven	_____
Toaster Oven	_____
Refrigerator	_____
What energy did I use as I got ready for school this morning?	
Air Conditioning/Heating	_____
Radio/CD Player	_____
TV/VCR/DVD Player	_____
Shower/Bath	_____
Hair Dryer	_____
Curling Iron/Electric Curlers/Hair Straightener	_____
What rooms had lights turned on this morning?	
Bedroom	_____
Bathroom	_____
Kitchen	_____
Family room	_____
Other	_____
How did I get to school today?	
Walk	_____
Bicycle	_____
School Bus	_____
Carpool	_____
Family Vehicle	_____

What energy did I use after school yesterday?

Air Conditioning/Heating	_____
Travel in Vehicle	_____
Lights	_____
Computer	_____
Video Game System	_____
CD Player/Radio	_____
TV/VCR/DVD Player	_____
Telephone	_____
Snack Preparation	_____

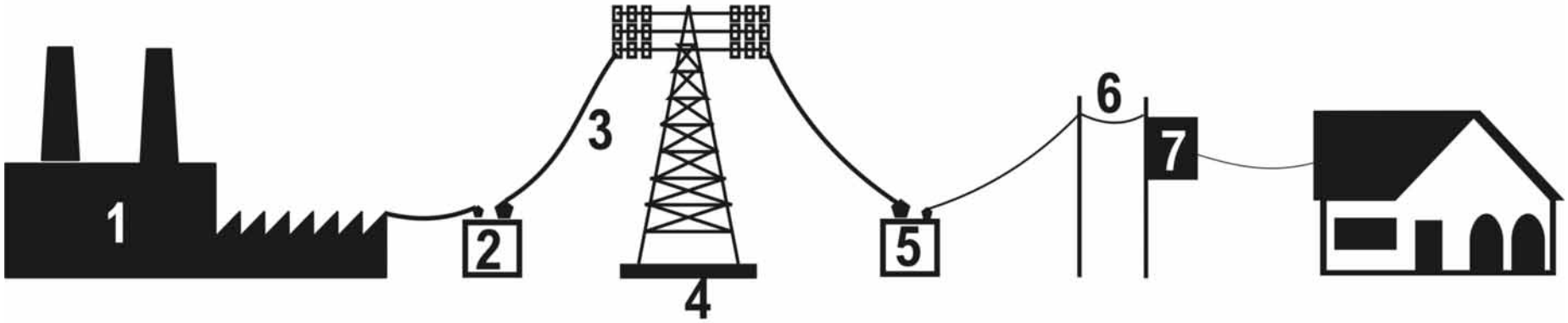
What energy was used at home last night?

Air Conditioning/Heating	_____
Microwave	_____
Stove/Oven	_____
Toaster Oven	_____
Refrigerator	_____
Grill	_____
Lights	_____
TV/VCR/DVD Player	_____
Shower/Bath	_____
Hair Dryer	_____

Total Energy Bucks Used _____

TRANSPORTING ELECTRICITY 1

Explain what each of the components numbered below does to get electricity from the generator to the consumer.



1. **Power plant -**
2. **Step-up transformer -**
3. **Transmission line -**
4. **Power tower -**
5. **Step-down transformer -**
6. **Distribution line -**
7. **Neighborhood transformer -**

REFLECTIONS 1

1. Define energy.

2. Define renewable.

3. Define nonrenewable.

4. List the ten major energy sources and categorize them as renewable (R) or nonrenewable (NR).

   1. 6.
   2. 7.
   3. 8.
   4. 9.
   5. 10.

4. Make a list of the forms of energy and give an example of each.

   1.
   2.
   3.
   4.
   5.
   6.
   7.
   8.
   9.

5. Using the ENERGY I USED TODAY worksheet, add up the number of activities that use electricity.

CONNECTIONS 1

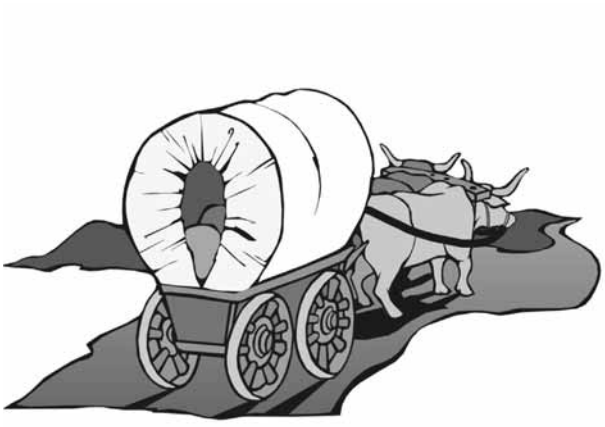
Choose a format such as a newspaper article, postcard, bookmark, brochure, or flyer to complete one of the activities listed below.

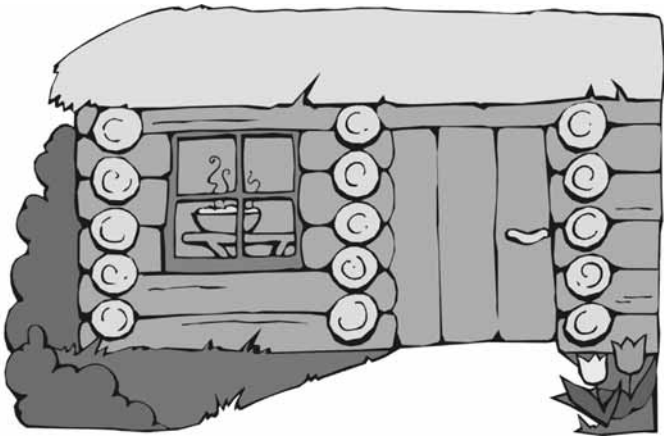
1. Describe what you do on a typical week-end and how your week-end would be different if you had no electricity.

2. Describe the energy sources an early pioneer might have used for lighting, heating, cooking, and transportation.

3. Looking at your "ENERGY I USED TODAY" list, how would you change your behavior if you had to reduce your total energy expenses by 10 energy bucks?

4. Why is so much of the energy we use today in the form of electricity?





ENERGY USE AT SCHOOL 2

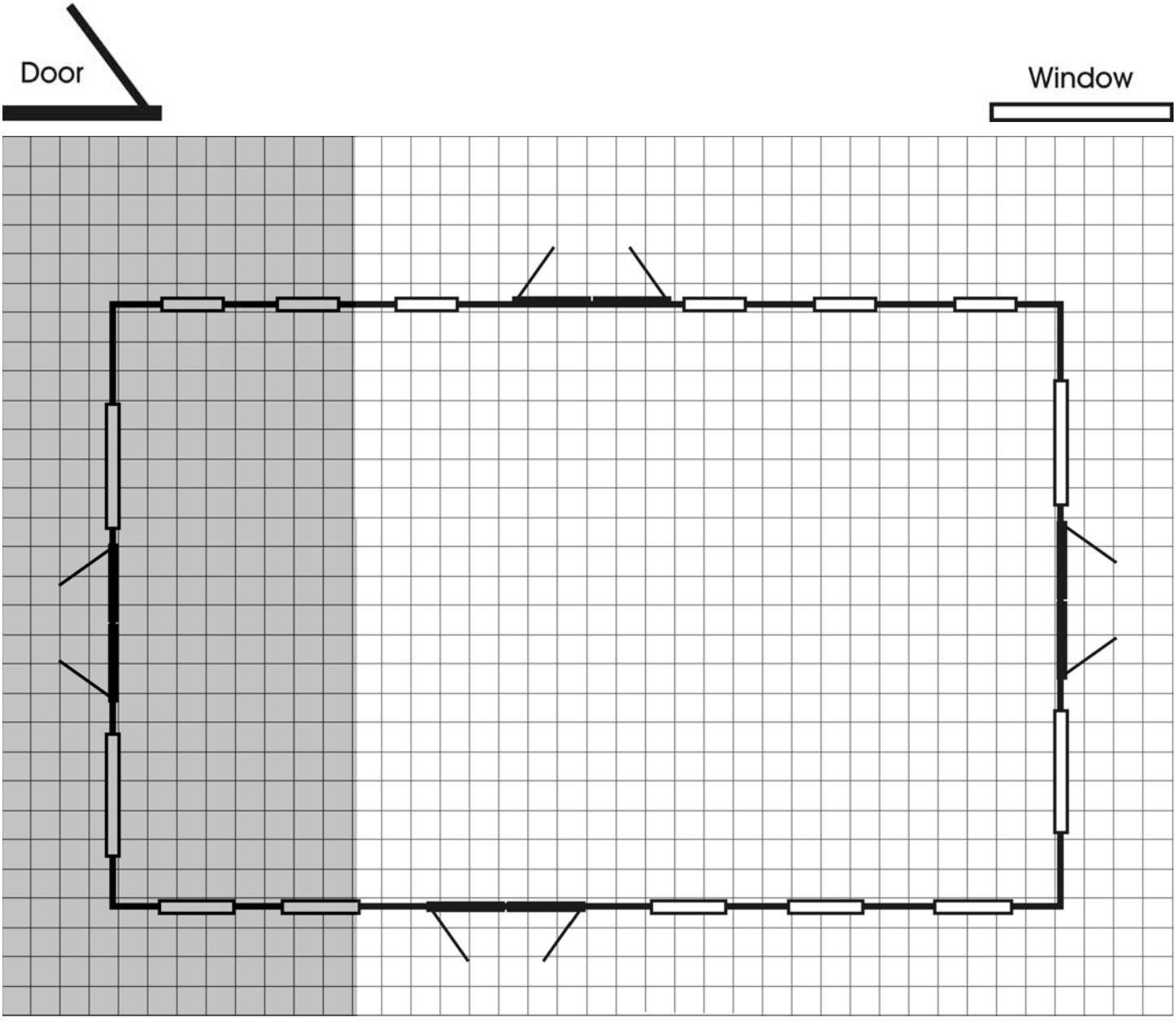
ENERGY USE AT SCHOOL DIAGRAMS

Your assignment is to draw three diagrams—one of the entire school building, one of your classroom, and one of the work area your teacher assigns to you. Begin by making sketches of your school, classroom and work area on notebook paper.

The next three pages are blank grids. Look at the diagram sample below to help you draw your school diagram. Look at the diagram on page 17 to help you draw your classroom and work area diagrams. When you think your sketches are accurate, draw your diagrams on the grids. Use the symbols below to indicate windows and doors.

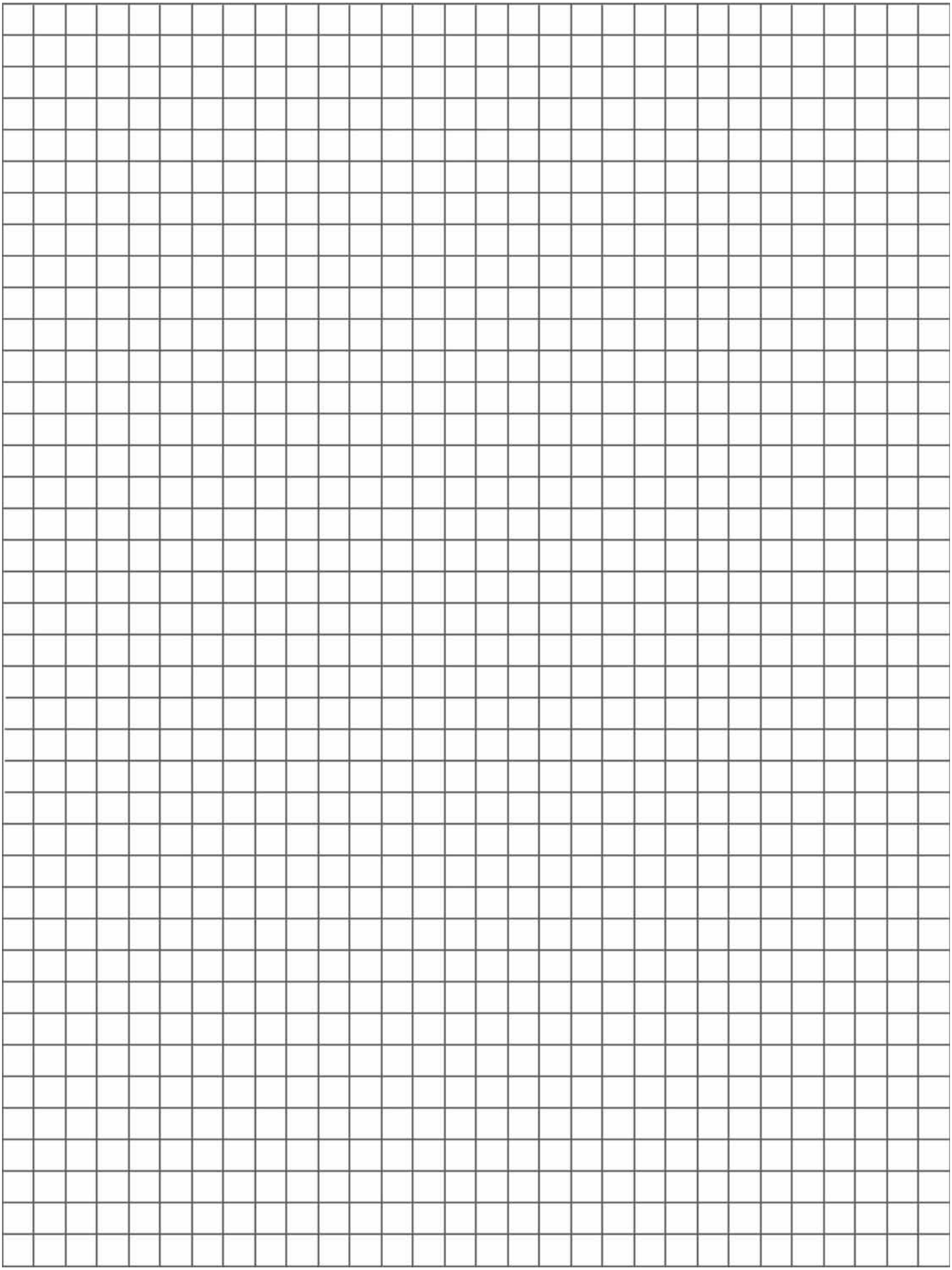
Make your diagram of the school large, but leave empty space around the building because you will be adding to the outside later.

Make the classroom and work area diagrams as large as possible.

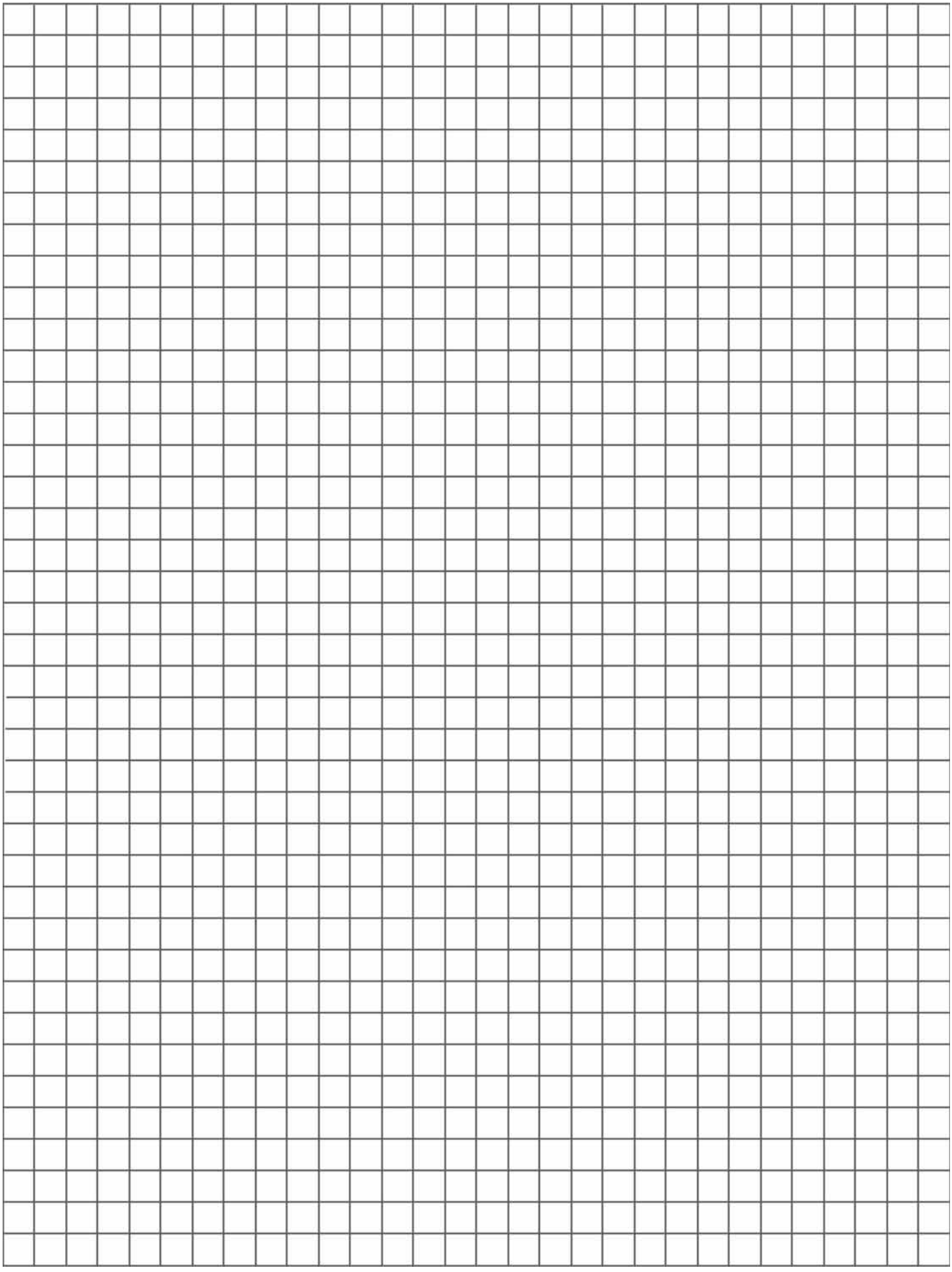


MY SCHOOL

MY CLASSROOM



MY WORK AREA: _____



REFLECTIONS 2

MY WORK AREA IS: _____

MEMBERS OF MY WORK GROUP: _____

1. How many exterior doors does your work area have? _____ Interior doors? _____
2. How many windows does your work area have? _____
3. How many electrical outlets does your work area have? _____
4. How many light fixtures does your work area have? _____
5. How many energy-consuming devices does your work area have? _____
6. How many heating/cooling devices or vents does your work area have? _____

Complete the chart below with data from your diagrams and the other work groups:

BUILDING INVENTORY

LOCATION	DOORS	WINDOWS	LIGHTS	ELECTRICAL DEVICES	HEAT/COOL DEVICES/VENTS	ELECTRICAL OUTLETS	OTHER
Building							
Classroom							
Office							
Library							
Cafeteria							
Gymnasium							

Notes:

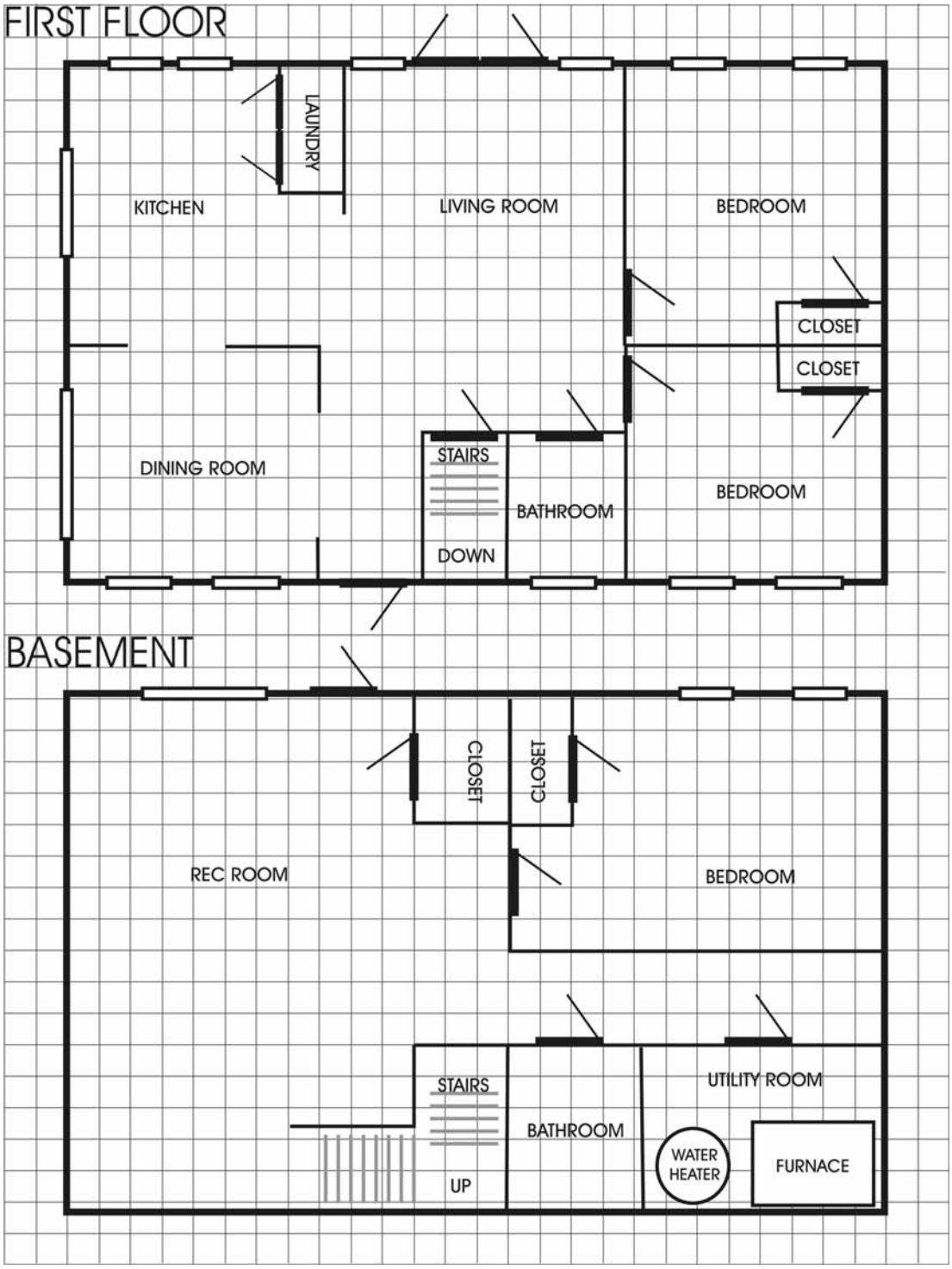
HOME ACTIVITY 3-2

Door

Window

ENERGY USE AT HOME DIAGRAMS

Your assignment is to draw a diagram of your home like the example below. Begin by making sketches of your home on notebook paper. If your home has several floors, make a sketch of each floor. The next two pages are blank grids. When you think your sketches are accurate, draw your diagram on the grids. If you have several floors, use both pages. Use the symbols above to indicate windows and doors. Make your diagrams large because you will be adding to them throughout the unit.



MY HOME 1

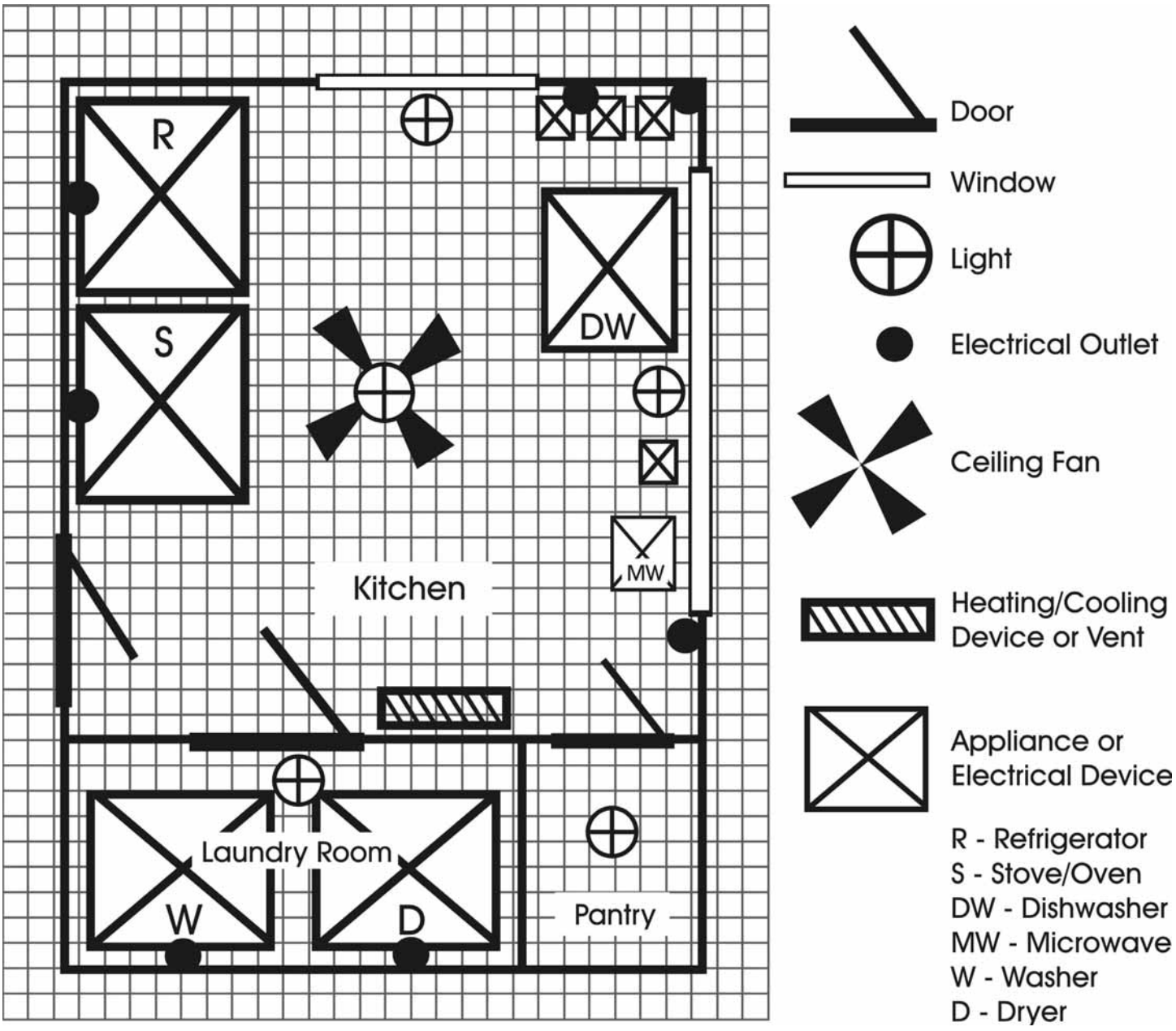
MY HOME 2

HOME ACTIVITY 3-3

ENERGY USE AT HOME DIAGRAMS

Your assignment is to draw diagrams of your **kitchen** and **bedroom** like the example below. Begin by making sketches of the rooms on notebook paper. When you think your sketches are accurate, draw your diagrams on the grids on the next two pages. Use the symbols below to indicate windows, doors, electrical outlets, lights, ceiling fans, and appliances and other electrical devices.

The sample diagram below is of a kitchen with a laundry room and pantry. It has three doors, two windows, and seven electric outlets. There are two lights in the kitchen area and one ceiling fan with a light, one light in the pantry, and one light in the laundry room. There are two labeled appliances in the pantry (washer and dryer) and four labeled appliances in the kitchen (refrigerator, stove, dishwasher, and microwave). There are also four smaller appliances in the kitchen that are not labeled. They are a disposal, a coffee maker, an electric can opener, and a toaster.



MY KITCHEN

MY BEDROOM

REFLECTIONS 3

INVESTIGATING HOME ENERGY USE

1. What new information did you learn by completing the Energy Usage Survey?

2. What tools and steps did you use to make accurate diagrams of your home?

3. How many doors are in your home? _____

4. How many windows are in your home? _____

5. How many energy-consuming devices did you find in your kitchen? _____

6. How many energy-consuming devices did you find in your bedroom? _____

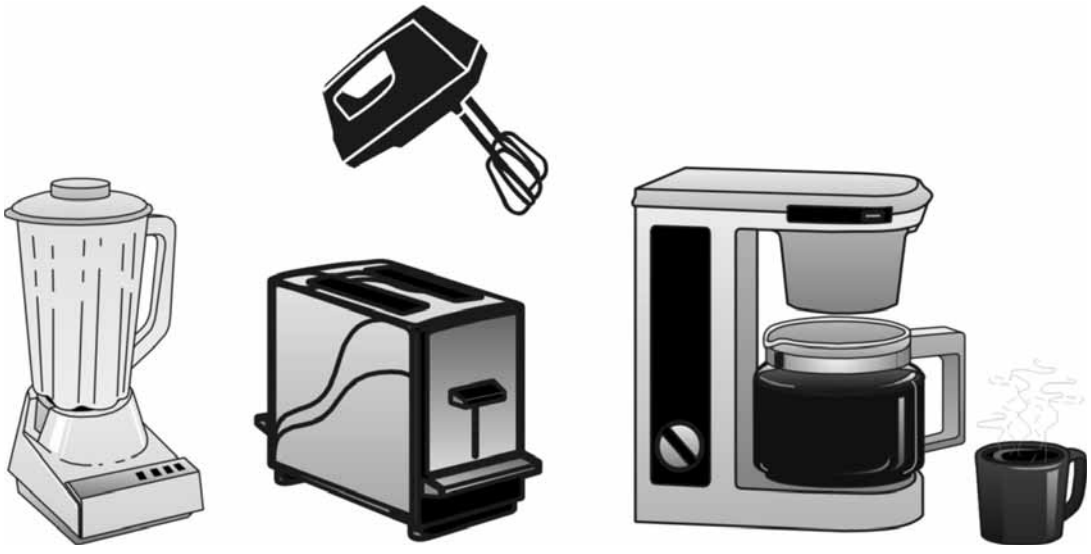
CONNECTIONS 3

Choose a format such as a newspaper article, postcard, bookmark, brochure, or flyer to complete one of the activities listed below.

1. Describe the information that surprised you the most as you completed the Energy Usage Survey.

2. Describe one way your family wastes energy and what you could do to change that behavior.

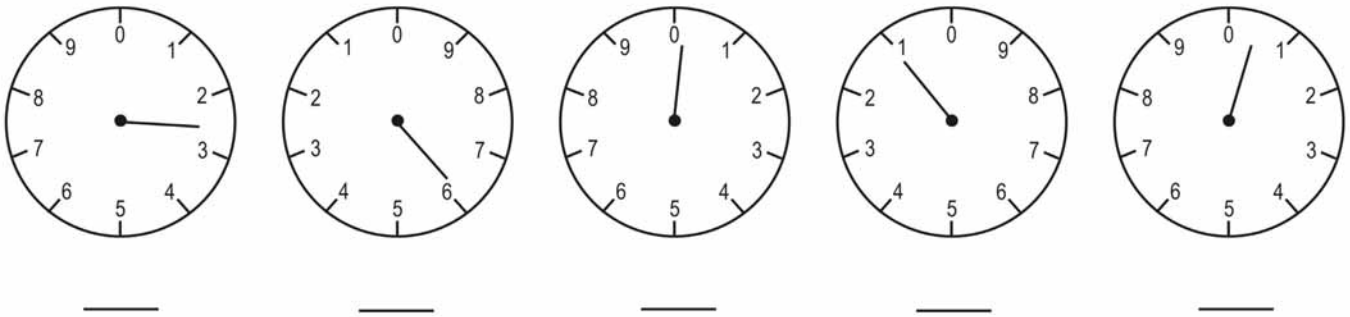
3. Describe one way your family saves energy.



READING AN ELECTRIC METER 4

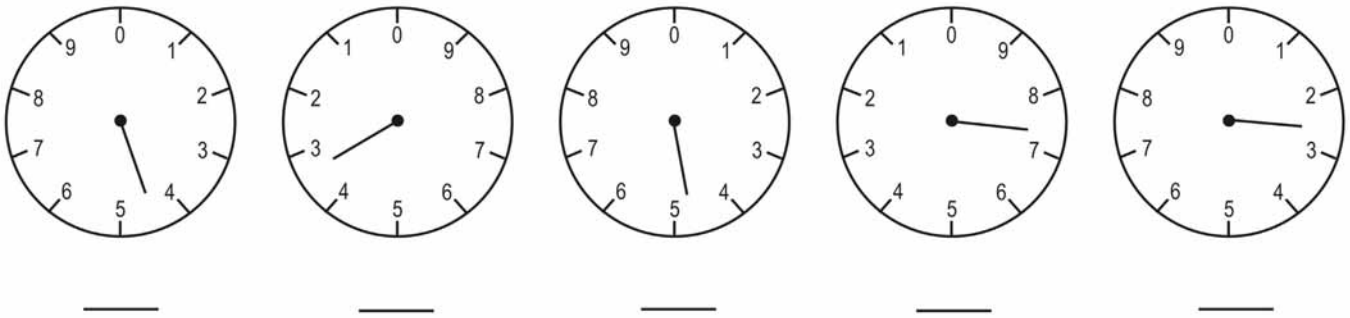
The electric meters below show the readings for the first and last days of January. See if you can determine how much electricity was used during the month. Read the meter dials and record the numbers on the lines below the dials. If the pointer is between two numbers, always record the smaller number.

On January 1, the electric meter looked like this:



_____ _____ _____ _____ _____

On January 31, the electric meter looked like this:



_____ _____ _____ _____ _____

How much electricity was used in January? Let's find out. Subtract the January 1 reading from the January 31 reading to find the kilowatt-hours (kWh) of electricity that were used during January.

January 31 reading	**=**	_____	**kWh**
January 1 reading	**=**	**–** _____	**kWh**
Electricity used	**=**	_____	**kWh**

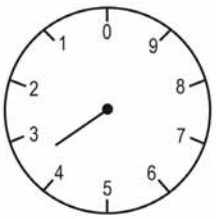
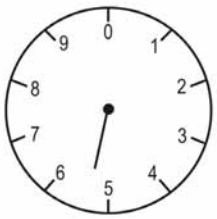
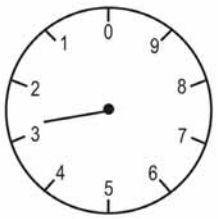
If the power company charges eleven cents ($0.11) for every kilowatt-hour (kWh) of electricity that is used, what is the cost of the electricity that was used in January? Let's find out. Multiply the kilowatt-hours of electricity used by the cost per kilowatt-hour.

_____ **kWh x $0.11/kWh = $** _____

READING A NATURAL GAS METER 4

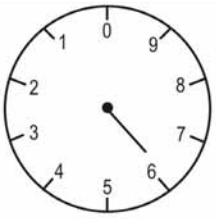
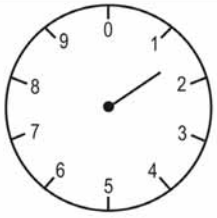
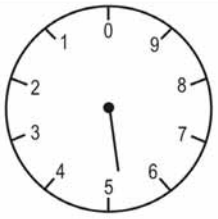
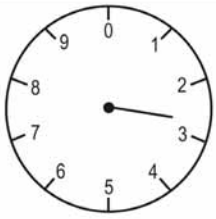
The natural gas meters below show the readings for the first and last days of January. See if you can determine how much natural gas was used during the month. Read the meter dials and record the numbers on the lines below the dials. If the pointer is between two numbers, always record the smaller number.

On January 1, the natural gas meter looked like this:


_____ _____ _____ _____

On January 31, the natural gas meter looked like this:

_____ _____ _____ _____

Natural gas is measured in CF or cubic feet—a measure of its volume—how much space it occupies. A cubic foot of natural gas is a small amount of fuel, so most gas meters measure natural gas in hundreds of cubic feet—or CCF. The first C means one hundred (from the Greek numbering system).

100 cubic feet = 100 CF = 1 CCF

How much natural gas was used in January? Let's find out. Subtract the January 1 reading from the January 31 reading to find the volume of natural gas that was used during January.

January 31 reading = _____

January 1 reading = **–** _____

Natural gas used = _____ **CCF**

The meter measures the natural gas in CCF, but the natural gas company charges by the amount of heat energy the gas contains. Heat energy is measured in **therms**. One CCF of natural gas contains on average one therm of heat energy. If the gas company charges $1.37 for a therm of gas (the national average for residential customers in 2008), how much did the gas cost in January? (1 CCF = 1 therm)

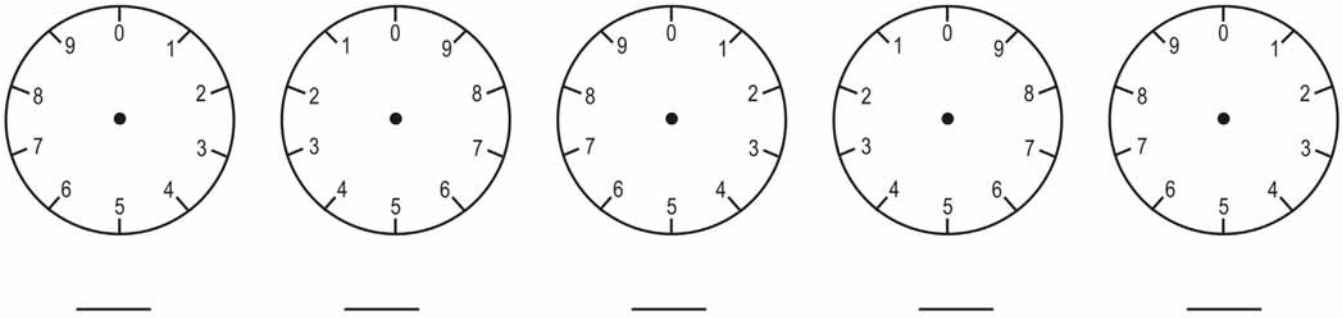
_____ **CCF gas used =** _____ **therm of heat energy**

Cost = _____ **therm X $1.37/therm = $** _____

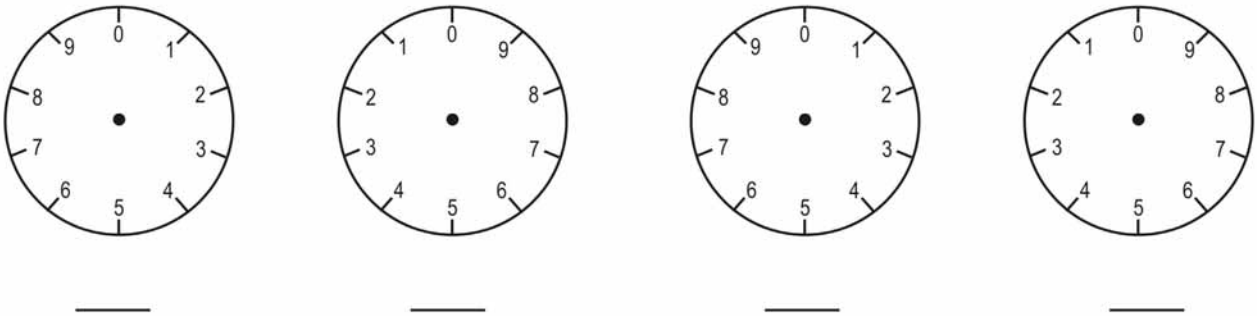
SCHOOL UTILITY METERS 4

On the diagrams below, record the readings of the electric and natural gas meters at your school. If your school's meters do not have dials, draw pictures of the meters on the bottom of the page and record the readings.

SCHOOL ELECTRIC METER



SCHOOL NATURAL GAS METER



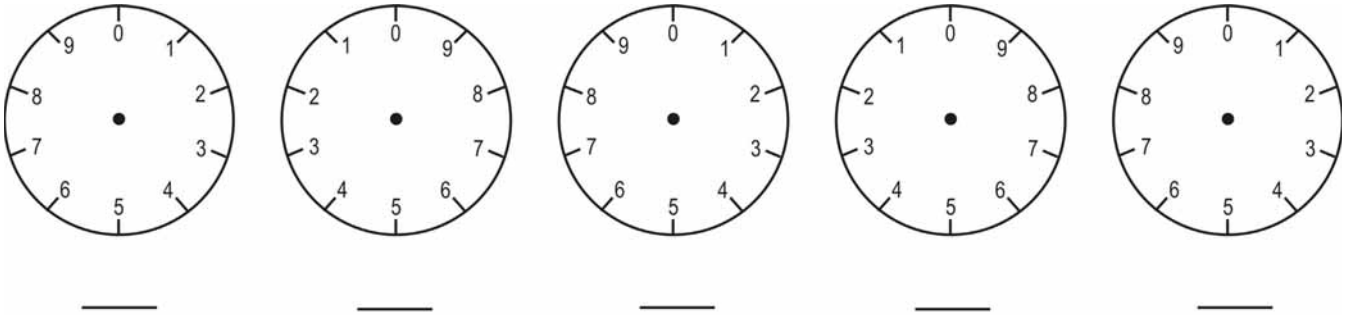
ELECTRIC METER **NATURAL GAS METER**

HOME ACTIVITY 4-1

READING YOUR ELECTRIC METER AT HOME

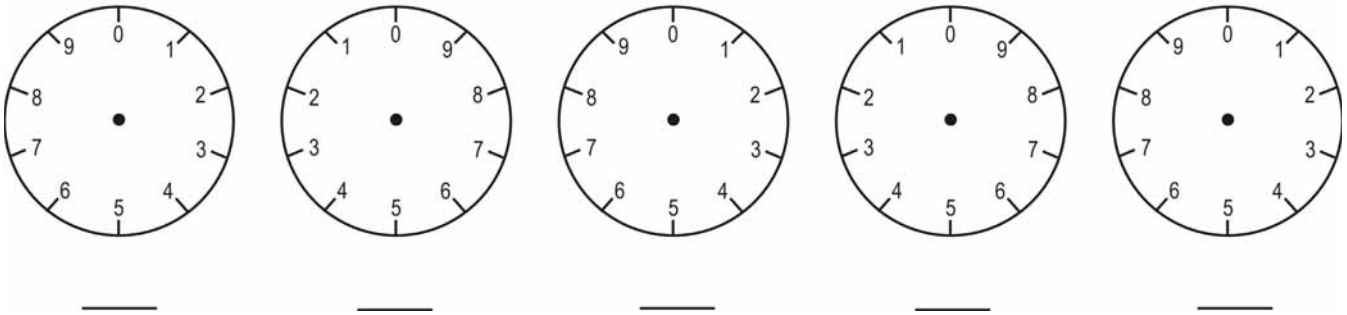
1. Your first assignment is to locate your electric meter at your home ***with the help of an adult*** and add it to your home diagram, using the symbol above.
2. Your second assignment is to read your electric meter at the same time on two consecutive days and record the readings on the meter faces below. Determine the amount of electricity used during the 24-hour period in kilowatt-hours, then calculate the cost of the electricity used if the rate is $0.11 per kilowatt-hour. Finally, multiply the cost of electricity for one day by 30 to determine the cost of electricity for a month if you use the same amount of electricity each day.
3. If you do not have access to your electric meter, use the meter readings of someone in the class to calculate costs.

Day 1 Date: _____ **Time:** _____



_____ _____ _____ _____ _____

Day 2 Date: _____ **Time:** _____



_____ _____ _____ _____ _____

Electricity Used:

Day 2 Reading _____ **kWh**

Day 1 Reading – _____ **kWh**

Electricity Used _____ **kWh**

Cost for One Day: _____ **kWh x $0.11/kWh = $** _____

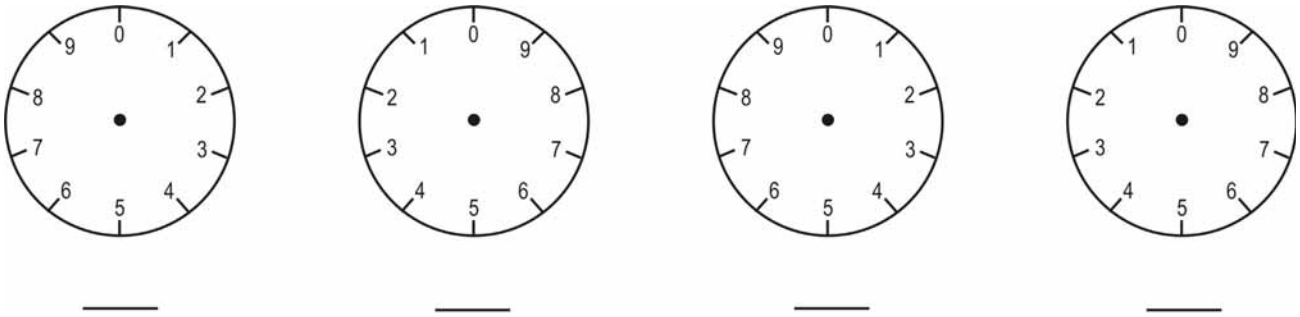
Cost for One Month: $_____ **x 30 days/mo. = $** _____

HOME ACTIVITY 4-2

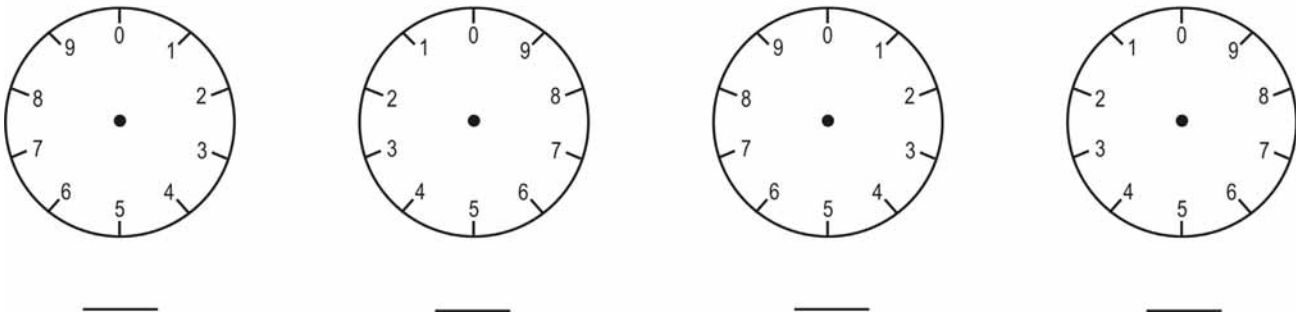
READING YOUR NATURAL GAS METER AT HOME

1. Your first assignment is to locate your natural gas meter at your home ***with the help of an adult*** and add it to your home diagram, using the symbol above.
2. Your second assignment is to read your natural gas meter at the same time on two consecutive days and record the readings on the meter faces below. Determine the volume of natural gas used during the 24-hour period (CCF), convert the volume to the amount of heat energy used (therms), then calculate the cost of the natural gas used if the rate is $1.37 per therm. Finally, multiply the cost of natural gas for one day by 30 to determine the cost of natural gas for a month if you use the same amount of natural gas each day.
3. If you do not have access to your natural gas meter, use the meter readings of someone in the class to calculate costs.

Day 1 Date: _____ **Time:** _____



Day 2 Date: _____ **Time:** _____



Natural Gas Used:

Day 2 Reading _____ **CCF** = _____ **therm**

Day 1 Reading – _____ **CCF** = _____ **therm**

Natural Gas Used _____ **CCF** = _____ **therm**

Cost for One Day: _____ **therm x $1.37/therm = $** _____

Cost for One Month: **$**_____ **therm x 30 days/mo. = $** _____

REFLECTIONS 4

MEASURING ENERGY USE

1. How many electric meters are there at your school? _____ Natural gas meters? _____

2. Does your school pay more or less than residential customers for energy?

3. If your family uses about the same amount of electricity each month, how much electricity would your home use in a year? _____ kWh

4. How much would you pay for electricity for a year at a cost of $0.11/kWh? $ _____

5. If you reduced your electricity consumption by 10 kWh per day, how much money would you save in a year? $ _____

6. The average household in the U.S. is expected to pay about $1,200 for electricity in 2009. How does your predicted cost compare to the national average?

7. If your family uses about the same amount of natural gas each month, how much would your home use in a year? _____ CCF

8. How much would you pay for natural gas for a year at a cost of $1.37/therm? $ _____

9. If you reduced your natural gas consumption by 2 CCF per day, how much money would you save in a year? $ _____

10. The average household in the U.S. is expected to pay about $1,000 for natural gas in 2009. How does your predicted cost compare to the national average?

CONNECTIONS 4

Choose a format such as a newspaper article, postcard, bookmark, brochure, or flyer to complete one of the activities listed below.

1. Describe an easy way you and your family could reduce electricity consumption at home and how you might get everyone in your family to join in your plan.

2. Describe one way that your school uses more electricity than it needs and how you might reduce that consumption.

3. Explain how to read an electric meter.

4. Compare the cost of electricity and natural gas in your area compared to the national average costs.

INSULATION INVESTIGATION 5

GOAL: To investigate the insulating properties of different materials.

MATERIALS: 2 radiation cans, 2 thermometers, insulating material, tape, 2 rubber bands

PROCEDURE: Remove the tops from the cans.

Insulate one can on the sides only.

Ask your teacher to fill both of your cans with hot water. Replace the tops.

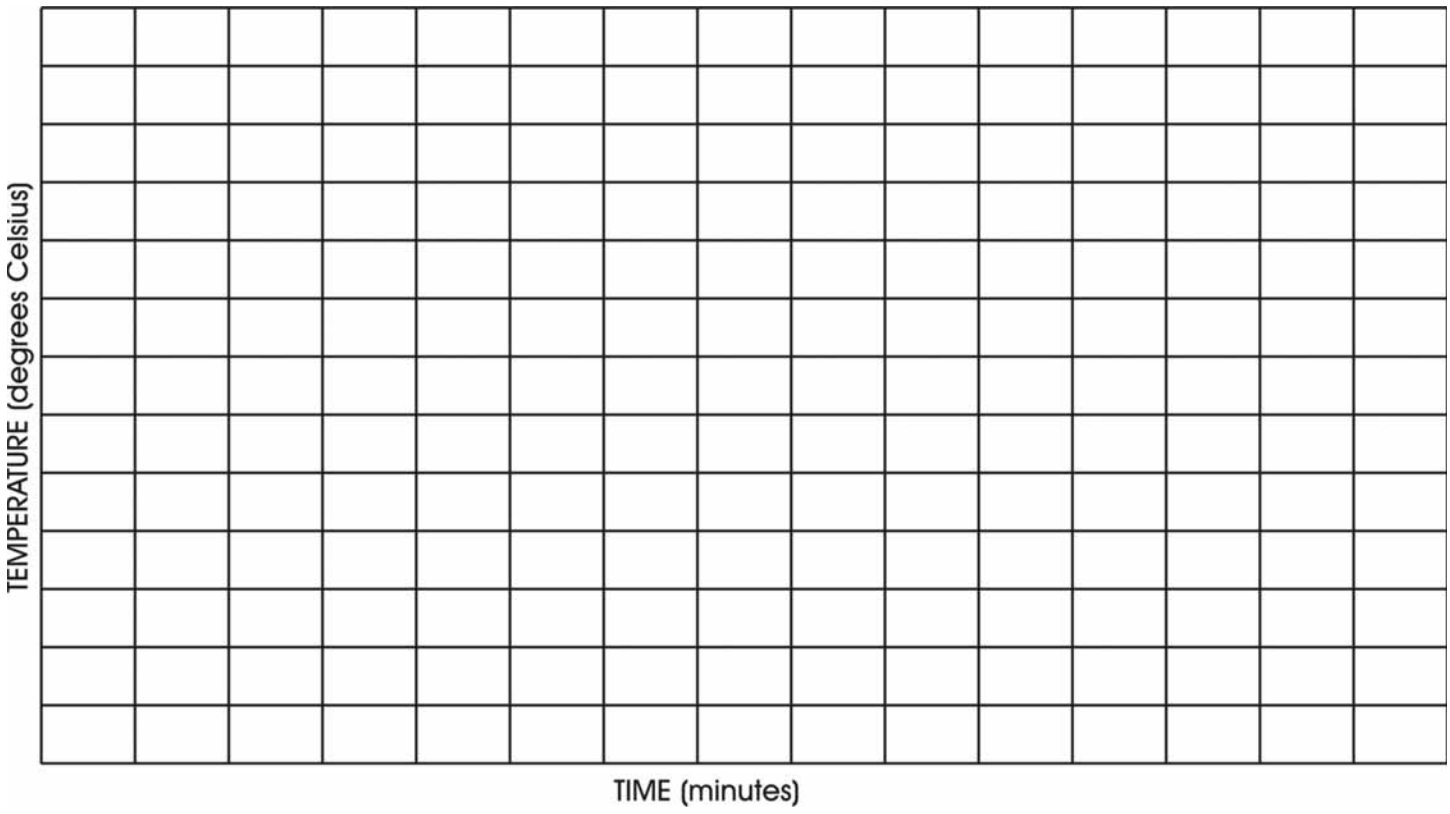
Suspend a thermometer through the hole in each top, making sure it does not touch the bottom or the sides of the can.

On the chart below, record the temperature (^{O}C) of the water in the cans at two-minute intervals for 20 minutes. Your teacher will keep track of the time with a timer.

Graph the results on the graph below.

TYPE OF INSULATION:

Time (min)	0	2	4	6	8	10	12	14	16	18	20	Δ
Insulated												
Uninsulated												



HOME ACTIVITY 5

INVESTIGATING HOME INSULATION AND INFILTRATION

READING: Pages 4–9 in your Energy Savers booklet.

MATERIALS: Electrical Outlet Gasket

PROCEDURE: With the help of an adult, measure the amount of insulation in the attic of your home:

_____ < 5 inches 2 points

_____ 5-10 inches 4 points

_____ > 10 inches 6 points

Open your outside doors and check the condition of the weather stripping between the doors and the door-frame.

_____ none 0 points

_____ poor 2 points

_____ fair 4 points

_____ good 6 points

Using the map on page 6 of the *Energy Savers* booklet, determine in which Insulation Zone your home is located.

Zone _____

According to the map, what are the recommended R ratings in your Insulation Zone for the following:

Attic _____

Walls _____

Floors _____

Using the graphic on page 8 of the *Energy Savers* booklet, decide with your family five areas of your home you will check for air leaks.

1. _____ 4. _____

2. _____ 5. _____

3. _____

Using the graph on page 9 of the *Energy Savers* booklet, determine the top three ways air can escape from your home.

1. _____

2. _____

3. _____

ACTIONS: **With an adult**, check the wall switches and electrical sockets for air leaks.

With an adult, install the switchplate and outlet gaskets where air leaks are found.

REFLECTIONS 5

INSULATION

1. In 20 minutes, how much did the temperature of the water in the uninsulated can change?

2. In 20 minutes, how much did the temperature of the water in the insulated can change?

3. After 20 minutes, what was the difference in temperature between the insulated and uninsulated cans?

4. Which material was the best insulator?

5. Which material was the worst insulator?

6. What variables in the experiment might make the results unreliable?

7. How might you change the experiment to get more reliable results?

CONNECTIONS 5

Choose a format such as a newspaper article, postcard, bookmark, brochure, or flyer to complete one of the activities listed below.

1. Describe what you learned from the insulation experiment and how it relates to saving energy at home.

2. Compare clothing and home insulation.

3. Encourage homeowners to make sure they have adequate insulation in their homes.

TEMPERATURE INVESTIGATION 6

MATERIALS: Student Thermometer

PROCEDURE: After viewing the school's heating and cooling system, add it to you school diagram.

Find out the answers to the following questions:

Which system is in operation? _____

What energy source fuels the heating system? _____

What energy source fuels the cooling system? _____

Locate the thermostat in the classroom. Add the thermostat to your classroom diagram, using the star symbol above.

Record the temperature setting of the thermostat. _____

Using the thermometer, record the actual temperature of the classroom. _____

Using the Thermostat Temperature Guide below, determine whether your classroom is saving or wasting energy and by how much.

_____

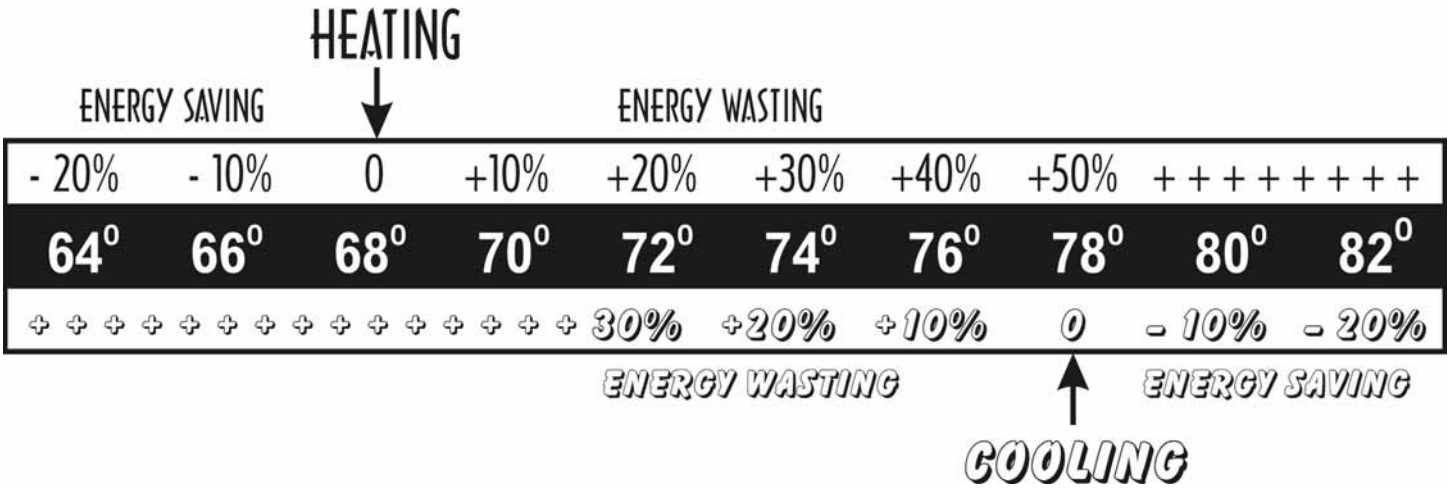
With your team, locate the thermostat in your work area and add it to your Work Area diagram.

Record the temperature setting of the thermostat. _____

Using the thermometer, record the actual temperature of the area. _____

Using the Thermostat Temperature Guide below, determine whether your area is saving or wasting energy and by how much.

_____



HOME ACTIVITY 6

INVESTIGATING THERMOSTATS

READING: Pages 10-15 in your Energy Savers booklet.

MATERIALS: Thermostat Temperature Guide

PROCEDURE: Locate the thermostat(s) in your home and add them to your home diagram using the star symbol above.

With the help of an adult, record the thermostat settings for your home:

Cooling Season:

_____ < 74^{O}	0 points
_____ 74^{O}-75^{O}	2 points
_____ 76^{O}-77^{O}	4 points
_____ > 77^{O}	6 points

Heating Season:

_____ >74^{O}	0 points
_____ 72^{O}-74^{O}	2 points
_____ 69^{O}-71^{O}	4 points
_____ < 68^{O}	6 points

We change our furnace filters this many times a year:

_____ Never	0 points
_____ Once	2 points
_____ 2-3 times	4 points
_____ > 3 times	6 points

Are there any heat-emitting devices located near the thermostat(s)? How would this affect the operation of the thermostat?

Show your family the Thermostat Temperature Guide and explain how it can help your family save money and energy.

Decide with your family two ways you can save energy on heating and cooling:

1. _____

2. _____

Post the Guide in a prominent place as a reminder to you and your family.

REFLECTIONS 6

HOME HEATING AND COOLING

1. What is the main source of heat for your home (natural gas/electricity/propane/wood-burning stove)?

2. Does your home have a fireplace, wood stove, or other space heater to provide additional heat?

3. How is your home cooled (central air conditioning/window air conditioners)?

4. Does your family use ceiling fans or other fans to circulate air?

5. Does your home have a programmable thermostat to control the temperature?

6. Does your family use blinds and drapes to help control temperature in your home?

7. Does your home have storm windows and doors?

8. Does your home have an attic fan?

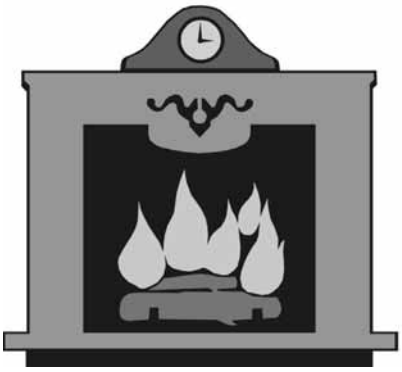
CONNECTIONS 6

Choose a format such as a newspaper article, postcard, bookmark, brochure, or flyer to complete one of the activities listed below.

1. What area of your house stays the warmest, what area stays the coolest, and why?

2. What are some ways you can be comfortable in your home without adjusting the temperature and using more energy?

3. List four ways your family could save energy when heating and cooling your home and explain.



WATER HEATING INVESTIGATION 7

GOAL: To investigate hot water heating and use.

READING: Page 16 of Energy Savers booklet.

MATERIALS: 1 Flow Meter Bag, 1 Hot Water Gauge

PROCEDURE: Add the the water heating system to your school diagram.

What energy source fuels the water heating system? _____

Record the energy efficiency of the system from the EnergyGuide Label on the water heating system. _____

Record the temperature setting of the thermostat. _____

With the help of an adult :

Locate all hot water sources in your assigned area and list them on the chart.

With the Flow Meter Bag, measure the water flow of all sources and record on the chart below. **SAFETY: Measure only COLD water with the Flow Meter Bag.**

With the Hot Water Gauge, measure the temperature of the hot water at all sources and record on the chart. **SAFETY: BE CAREFUL not to touch the water.**

Determine and record the recommended temperature setting from page 16 of the Energy Savers booklet.

Gather data from the other teams and add to the chart .

LOCATION	WATER FLOW	RECOMMENDED TEMPERATURE	ACTUAL TEMPERATURE

HOME ACTIVITY 7-1

INVESTIGATING HOME WATER HEATING AND USAGE

READING: Pages 16–17 in your Energy Savers booklet.

MATERIALS: Hot Water Gauge, Flow Meter Bag, Kitchen Sink Aerator, Bathroom Sink Aerator, Low Flow Showerhead, Teflon Tape

PROCEDURE: ***With the help of an adult:***

Locate the water heater and add it to your home diagram using the symbol above.

Read and record the temperature setting of the water heater. _____

Locate the EnergyGuide label and record the efficiency rating. _____

_____ uses the most energy	0 points
_____ uses more than average energy	2 points
_____ uses the average energy	3 points
_____ uses less than average energy	4 points
_____ uses the least energy	6 points

Use the Hot Water Gauge to measure the temperature of the hot water. _____

ACTION: Use the Flow Meter Bag to measure how much COLD water your main shower uses. If the showerhead is NOT efficient, install the low flow showerhead and measure again.

ACTION: Use the Flow Meter Bag to measure how much COLD water your main bathroom sink and kitchen sink use. If they are NOT efficient, install the energy efficient aerators and measure again.

HOT WATER GAUGE

NO COLOR CHANGE < 120°
GREEN = display
BLUE > display
TAN < display
BLACK/RED SQUARE > 150°
RECOMMENDED = 115°

Water Flow	Before Installation	After Installation
Main Shower		
Main Bathroom Sink		
Kitchen Sink		

HOT WATER GAUGE:	measures the temperature of your hot water. See instructions on plastic card.
FLOW METER BAG:	measures the amount of water flow. Instructions are on the bag. Savings are based on Washington, DC rates. Use actual local rates for more accurate estimated savings.
LOW-FLOW SHOWERHEAD:	reduces water flow. Remove old showerhead, clean connection pipe, place a small piece of Teflon tape around pipe, and install new low-flow showerhead.
AERATORS:	reduce the water flow without reducing pressure. Smaller aerator is for bathroom sink; larger aerator is for kitchen sink. Install using instructions for showerhead.
TEFLON TAPE:	insures a tight seal for showerhead and aerators.

HOME ACTIVITY 7-2

COMPARING ENERGYGUIDE LABELS

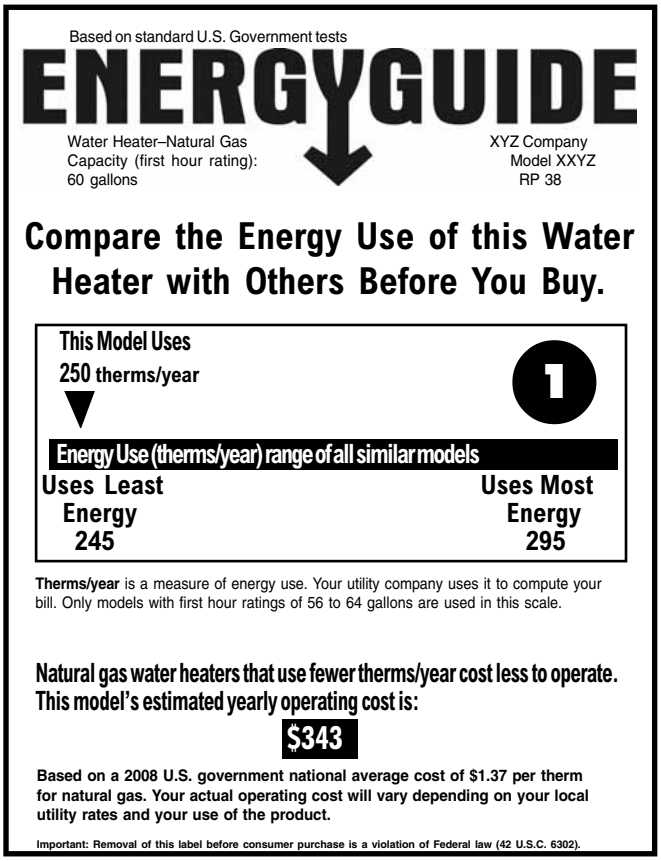
Your family needs to buy a new water heater. Water heaters usually last a long time—10 years or more—so you can save a lot of money on an energy-efficient one. Use the chart below to figure out which water heater to buy comparing the information on the EnergyGuide labels.

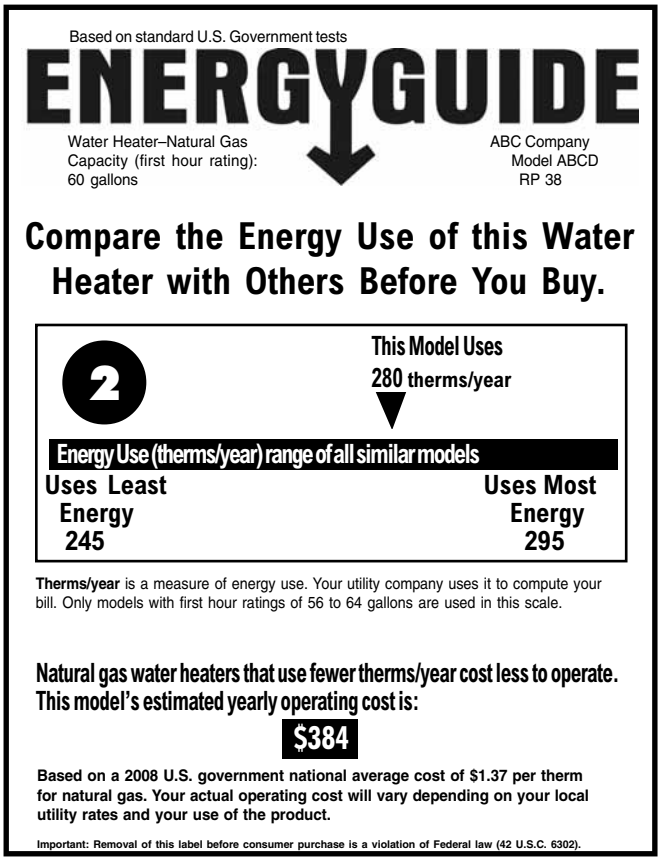
How many years will it take before you begin to save money?

How much money will you have saved after seven years?

Water Heater 1: Purchase Price: $375.00 Water Heater 2: Purchase Price: $250.00

Water Heater 1	Expenses	Cost to date	Water Heater 2	Expenses	Cost to date
Purchase Price			Purchase Price		
Year One			Year One		
Year Two			Year Two		
Year Three			Year Three		
Year Four			Year Four		
Year Five			Year Five		
Year Six			Year Six		
Year Seven			Year Seven		





REFLECTIONS 7

WATER HEATING AND USAGE

1. What energy source fuels your water heater?

2. How old is your water heater?

3. Is your water heater wrapped with an insulating blanket?

4. Is your water heater set at the recommended temperature? If not, what is the setting? _____

5. How efficient is your water heater according to the EnergyGuide label?

6. Did you install the low-flow showerhead and aerators? Why or why not?

7. Use the graph on page 17 of your Energy Savers booklet to determine the top uses of hot water in the home:

   1. _____

   2. _____

CONNECTIONS 7

Choose a format such as a newspaper article, postcard, bookmark, brochure, or flyer to complete one of the activities listed below.

1. What can you and your family do to reduce your hot water use?

2. What did you learn using the Hot Water Gauge and the Flow Meter bag?

3. Explain how buying an energy efficient appliance can save money, even if it costs more to buy.

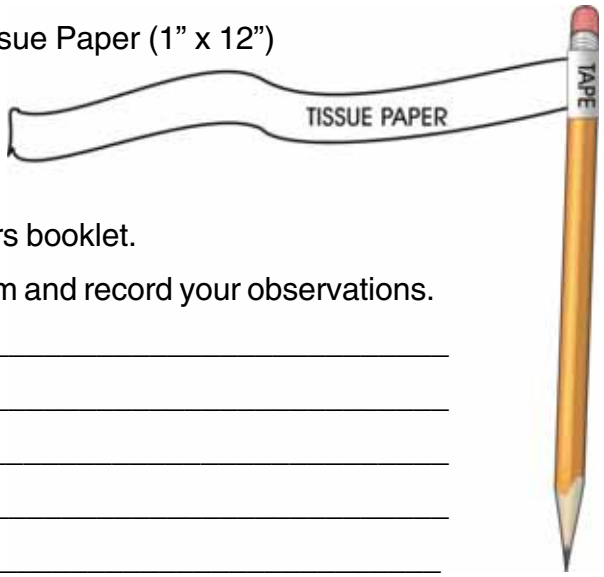
WINDOWS INVESTIGATION 8

GOAL: To investigate windows and air infiltration.

READING: Pages 18–19 of Energy Savers booklet.

MATERIALS: 1 Pencil, 1 Piece of Tape, 1 Piece of Tissue Paper (1" x 12")

PREPARATION: Tape a piece of tissue paper to the end of a pencil as shown in the picture.



PROCEDURE: Read pages 18-19 in your Energy Savers booklet.

CLASSROOM: Examine the window(s) in your classroom and record your observations.

Direction windows face _____

Single or double pane _____

Special coating _____

Blinds or shades _____

Locking mechanism _____

Caulking & weatherstripping _____

Other observations _____

Use the pencil with the tissue paper to check for air infiltration around the windows when they are closed. The tissue paper will flutter if any air is infiltrating. Record your observations.

_____

_____

WORK AREA: Examine the window(s) in your work area and record your observations.

Direction windows face _____

Single or double pane _____

Special coating _____

Blinds or shades _____

Locking mechanism _____

Caulking & weatherstripping _____

Other observations _____

Use the pencil with the tissue paper to check for air infiltration around the windows when they are closed. The tissue paper will flutter if any air is infiltrating. Record your observations.

_____

_____

HOME ACTIVITY 8

INVESTIGATING WINDOWS AND AIR INFILTRATION

READING: Pages 18–19 in your Energy Savers booklet.

MATERIALS: Pencil with tissue paper.

PROCEDURE: Examine the windows in your home and record your observations.

Number of windows _____

Age of windows _____

_____ single pane - no storm windows	0 points
_____ single pane with plastic sheeting	2 points
_____ single pane with storm windows	4 points
_____ double pane	6 points
_____ double pane with gas fill	8 points

Special coating	_____ yes	_____ no
Heavy blinds or shades	_____ yes	_____ no
Awnings over S or W facing	_____ yes	_____ no
Locking mechanism	_____ yes	_____ no
Caulking & weatherstripping	_____ yes	_____ no

Other observations _____

Use the pencil with the tissue paper to check for air infiltration around the windows when they are closed. The tissue paper will flutter if any air is infiltrating. Record your observations.

_____

_____

REFLECTIONS 8

WINDOWS AND AIR INFILTRATION

1. Was there air infiltration from any of the windows in your classroom or work area?

2. Are any of the windows in your classroom or work area cracked or broken?

3. How would you rate the overall energy efficiency of your school's windows?

4. What could you do besides replacing the windows to make your school's windows more energy efficient?

5. Was there air infiltration from any of the windows in your home?

6. Are any of the windows in your home cracked or broken?

7. How would you rate the overall energy efficiency of your home's windows?

8. What could you do besides replacing the windows to make your home's windows more energy efficient?

CONNECTIONS 8

Choose a format such as a newspaper article, postcard, bookmark, brochure, or flyer to complete one of the activities listed below.

1. What can you and your family do to make your windows more energy efficient?

2. What did you learn by examining your windows and investigating air infiltration through your windows?

3. List "Energy Saving Tips" for windows.

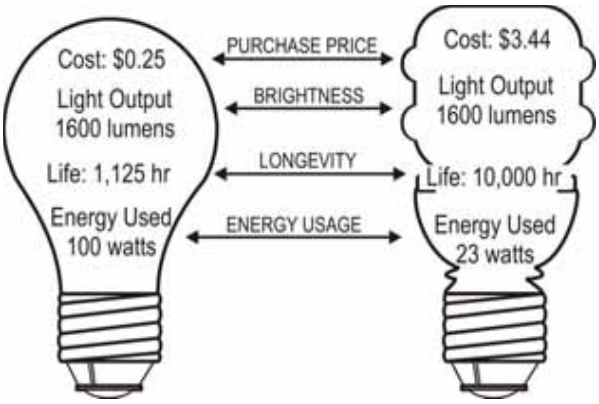
HOME ACTIVITY 9

COMPARING LIGHTBULBS

READING: Pages 20–21 in your Energy Savers booklet.

MATERIALS: Compact Fluorescent Lightbulbs

PROCEDURE: With your family, examine the picture of the lightbulb packages below and the diagram on the right that shows the data of the incandescent (IL) and compact fluorescent (CFL) bulbs.



Notice that the amount of light produced by the bulbs is the same, but the wattage, the cost and the life of the bulbs are different.

Explain how you entered the data on the chart on the next page to determine the amount of money you can save by using CFLs instead of incandescent lightbulbs.

With your family, complete the form on page 50 and discuss the results.

ACTION: Replace incandescent lightbulbs in your home with CFLs.

INCANDESCENT

CFL

DO THE MATH—FOR 10,000 HOURS OF LIGHT 9

INCANDESCENT BULB:

HOW MANY BULBS TO PRODUCE 10,000 HOURS IF EACH BULB = 1,125 HOURS?

$$\frac{\textbf{10,000 h}}{\textbf{1,125 h/bulb}} = \_\_\_\_\_ \textbf{ BULBS}$$

WHAT IS THE TOTAL COST OF BULBS TO PRODUCE 10,000 HOURS OF LIGHT?

_____ BULBS X $ _____ PER BULB = $ _____

WHAT IS THE COST OF ELECTRICITY AT A RATE OF $0.09 PER KILOWATT-HOUR (kWh)?
(ONE KILOWATT-HOUR = 1,000 WATT-HOUR)

100 W X 10,000 h = 1,000,000 Wh

$$\frac{\textbf{1,000,000 Wh}}{\textbf{1,000 W/ kW}} = \textbf{1,000 kWh X \$0.11/kWh = \$ \_\_\_\_\_}$$

COMPACT FLUORESCENT BULB:

WHAT IS THE TOTAL COST OF BULBS TO PRODUCE 10,000 HOURS OF LIGHT?

_____ BULBS X $ _____ PER BULB = $ _____

WHAT IS THE COST OF ELECTRICITY AT A RATE OF $0.09 PER KILOWATT-HOUR (kWh)?
(ONE KILOWATT-HOUR = 1,000 WATT-HOUR)

23 W X 10,000 h = 230,000 Wh

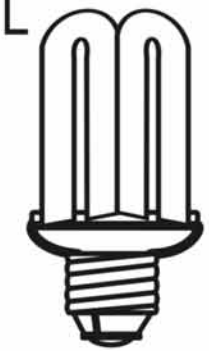
$$\frac{\textbf{230,000 Wh}}{\textbf{1,000 W/kW}} = \textbf{230 kWh X \$0.11/kWh = \$ \_\_\_\_\_}$$

COST OF 10,000 HOURS OF LIGHT 9

IL

COST OF BULB(S) + COST OF ELECTRICITY = IL LIFE CYCLE COST

CFL



COST OF BULB(S) + COST OF ELECTRICITY = CFL LIFE CYCLE COST

IL LIFE CYCLE COST − CFL LIFE CYCLE COST = LIFE CYCLE SAVINGS

REFLECTIONS 9

LIGHTING

1. What types of lights are used in your school?

2. How many total lightbulbs are in your home? _____

3. How many compact fluorescent lightbulbs are in your home?

_____ No CFLs	0 points
_____ 1-2 CFLs	2 points
_____ 3-4 CFLs	4 points
_____ > 4 CFLs	6 points

4. How much money did you and your family calculate you could save by replacing one incandescent bulb with a CFL?

5. If you replaced five incandescent bulbs with CFLs, how much money could you save?

6. Did you install the CFL from your kit in your home?

7. When you replace an incandescent bulb with a CFL, what measurement on the box should you use to make sure you are getting a comparable lightbulb?

8. If a nightlight uses only $0.02 of electricity per year and lasts a lifetime, how much would you pay for electricity if you used the nightlight for 80 years?

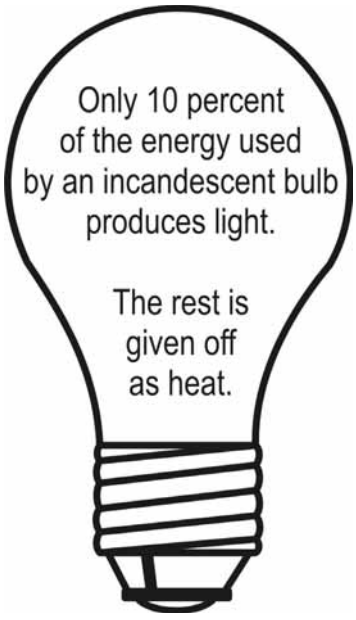
CONNECTIONS 9

Choose a format such as a newspaper article, postcard, bookmark, brochure, or flyer to complete one of the activities listed below.

1. What factors make some people reluctant to use CFLs?

2. Convince someone to replace incandescent bulbs with CFLs.

3. Inform someone about the benefits of CFLs.



MEASURING ELECTRICITY USE 10

MACHINES AND APPLIANCES

GOAL: To measure the electricity consumption of machines and calculate their yearly operating costs.

BACKGROUND: Electricity consumption is measured in killowatt-hours (kWh). A killowatt is equal to 1,000 watts. A Kill A Watt monitor can measure the electrical consumption of machines and electrical appliances. The average cost of a kWh of electricity for schools is $0.08 per kWh.

MATERIALS: Kill A Watt Monitor

PROCEDURE: As a class, select three machines in the classroom to investigate.

As a work group, select one machine in your work area to investigate.

Measure the number of **watts** the machines use over a **six-minute period** of time, using the Kill A Watt Monitor. Record the type of machine and the wattage used in the chart below.

Multiply the wattage by 10 to calculate the hourly consumption in watts. Record.

Divide by 1,000 to calculate usage in kilowatts. Record.

Estimate the number of hours the machine is used each week and record.

Multiply the hours per week by 40 (for a 40-week school year) and record the hours of use per year.

Multiply kW per hour by the hours per year to determine kWh per year. Record.

Record the average rate per kWh of $0.10 or the actual rate your school pays.

Multiply kWh per year by the rate to determine yearly cost.

Collect data from the other work groups to complete the chart.

Electrical Device	Watts 6 min	Watts 60 min	kW 1 hour	Hours per Week	Hours per Year	kWh per Year	Rate $/kWh	Yearly Cost

HOME ACTIVITY 10

CHANGE FOR THE BETTER WITH ENERGY STAR

APPLIANCES & ENERGYGUIDE LABELS

READING: Pages 22–30 in your Energy Savers booklet.

MATERIALS: Refrigerator Thermometer

PROCEDURE: With the help of an adult, test the seal on the door of your refrigerator. To do this, you will need a dollar bill. Close the door over the dollar bill so that it is half in and half out of the refrigerator. Grasp the end of the bill with both hands by the corners and pull slowly and steadily. Do not try to jerk it; it might tear.

_____ comes out easily	0 points
_____ comes out fairly easily	2 points
_____ comes out with difficulty	4 points
_____ does not move	6 points

Use the Refrigerator Thermometer to measure the temperature of your refrigerator and freezer and record in the chart below.

APPLIANCE	TEMPERATURE	SAFE ZONE
Refrigerator		37^{o} - 40^{o} F
Freezer Section		0^{o} - 5^{o} F
Separate Freezer		0^{o} F or colder

Look around your house for large or small appliances that have Energy Star labels on them. Explain to your family that the Energy Star means the appliances meet strict energy efficiency standards. What Energy Star appliances did you find?

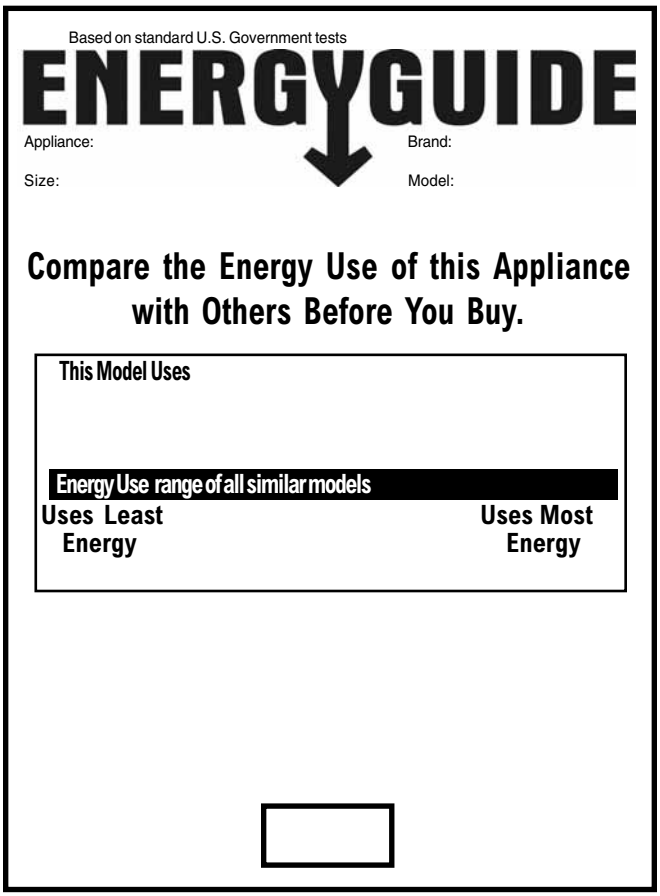
_____ _____

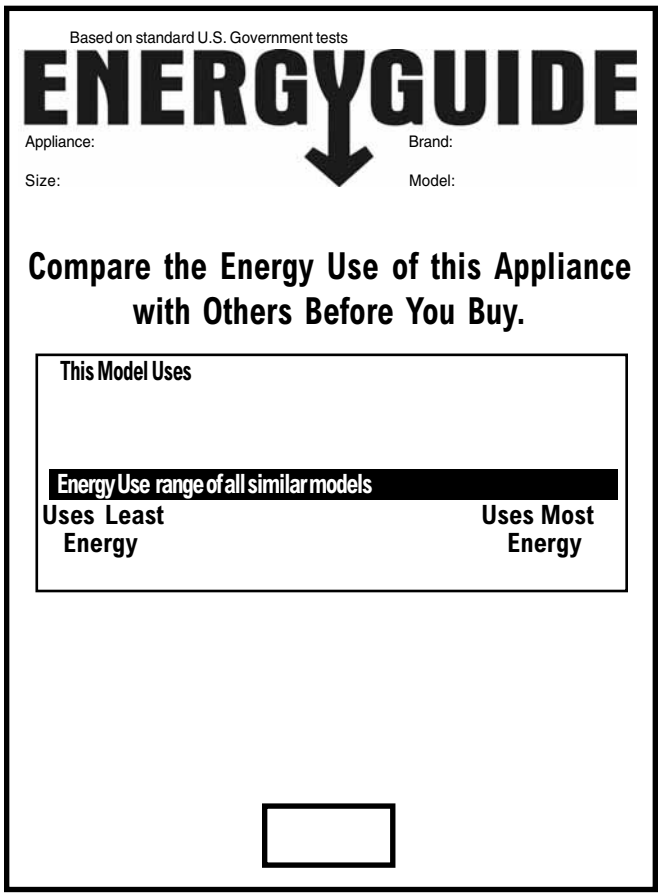
_____ _____

Take a trip with your family to a store that sells large appliances, such as refrigerators. Using the blank EnergyGuide labels on the next two pages, record information from the EnergyGuide labels on two models of different appliances, such as refrigerators and dishwashers. Make sure that one appliance of each set is an energy efficient model. Make sure you also record the price of each appliance.

Use the charts at the bottom of the pages to calculate the payback periods of the energy efficient models of each set of appliances.

PAYBACK PERIODS 10

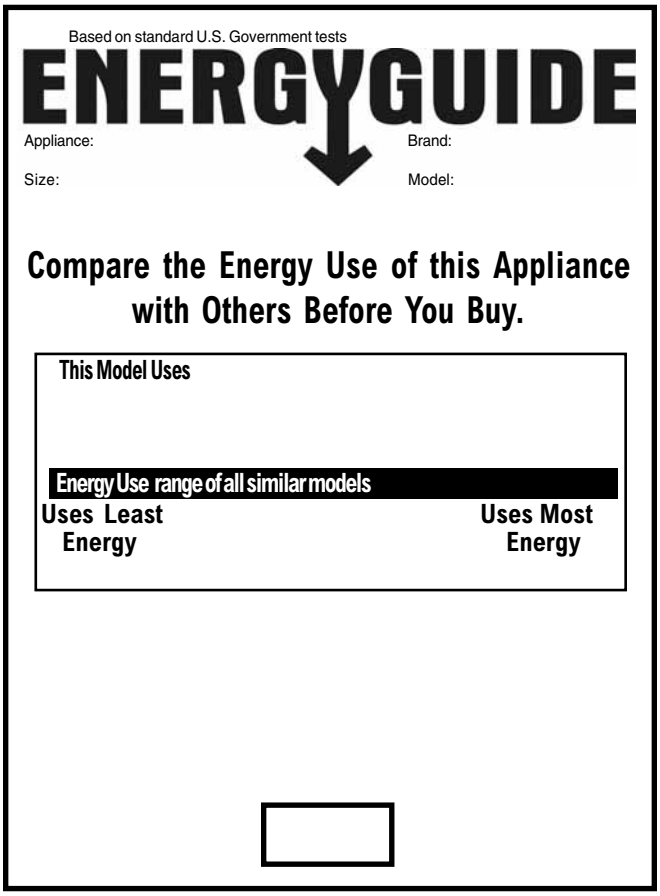


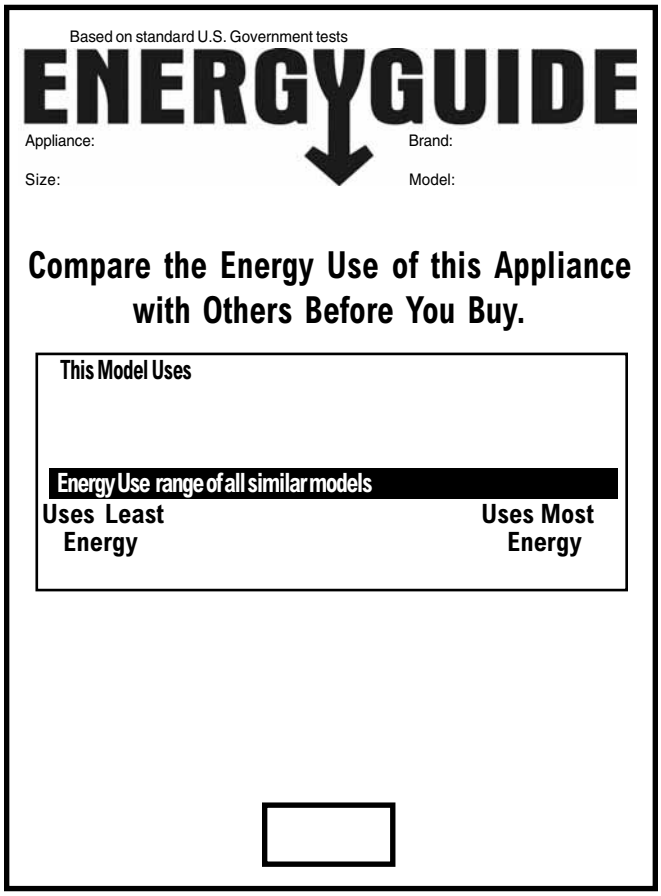


TYPE OF APPLIANCE: _____

Appliance 1	Expenses	Cost to date	Appliance 2	Expenses	Cost to date
Purchase Price			Purchase Price		
Year One			Year One		
Year Two			Year Two		
Year Three			Year Three		
Year Four			Year Four		
Year Five			Year Five		
Year Six			Year Six		
Year Seven			Year Seven		
Year Eight			Year Eight		
Year Nine			Year Nine		
Year Ten			Year Ten		

PAYBACK PERIODS 10





TYPE OF APPLIANCE: _____

Appliance 1	Expenses	Cost to date	Appliance 2	Expenses	Cost to date
Purchase Price			Purchase Price		
Year One			Year One		
Year Two			Year Two		
Year Three			Year Three		
Year Four			Year Four		
Year Five			Year Five		
Year Six			Year Six		
Year Seven			Year Seven		
Year Eight			Year Eight		
Year Nine			Year Nine		
Year Ten			Year Ten		

REFLECTIONS 10

APPLIANCES AND ELECTRICAL DEVICES

1. How many machines in your classroom or assigned area are Energy Star rated? How many are not?

Energy Star	Not Energy Star
1. _____	1. _____
2. _____	2. _____
3. _____	3. _____
4. _____	4. _____
5. _____	5. _____
6. _____	6. _____

2. What machines did your team measure with the Kill A Watt monitor?

3. How energy efficient was the seal on your refrigerator?

4. Were the temperatures of your refrigerator and freezer within the Safe Zones?

5. If not within the Safe Zones, did you and your family adjust the temperature?

6. What kinds of appliances did you compare and what were the payback periods for the more efficient models?

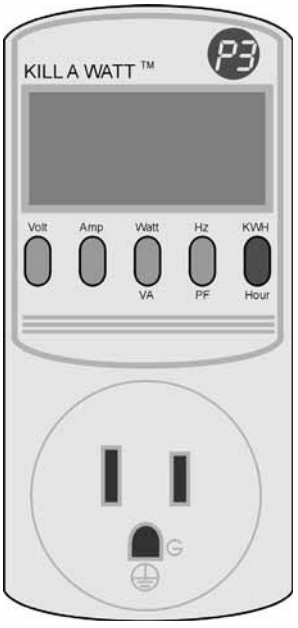
CONNECTIONS 10

Choose a format such as a newspaper article, postcard, bookmark, brochure, or flyer to complete one of the activities listed below.

1. Describe a Kill A Watt monitor and explain how it can help save energy.

2. Describe the concept of payback period and how it applies to energy efficient appliances.

3. Encourage someone to purchase energy efficient appliances.



YOUR FAMILY RATING 11

In many of the activities, you and your family rated your energy consumption and efficiency. Now you will add all of those points together to determine your family's overall rating. Share this information with your family.

YOUR RATINGS:

Page 33:	Insulation Points:	_____
	Weatherstripping Points:	_____
Page 37:	Heating Points:	_____
	Cooling Points:	_____
	Furnace Filter Points :	_____
Page 41:	Water Heater Points:	_____
Page 46:	Windows Points:	_____
Page 52:	Lighting Points:	_____
Page 55:	Refrigerator Points:	_____
	TOTAL POINTS	_____

RATING GUIDE:

40 or more points	EXCELLENT
30–39 points	GOOD START but there's more you can do
29 or less points	Make a commitment today to save energy at home and at school

SAVINGS PLAN:

Make a list of things your family can do to save energy and money.

CONNECTIONS 11

1. What are the most important things you've learned by studying about energy and how to save it?

2. What would you like to know more about?

3. What things do you think you and your family will do to save energy at home?

GLOSSARY

Aerator	a device used to add air to the water coming out of a faucet.
Ampere	a measure of the flow of electric current.
Appliance	any piece of equipment, usually powered by electricity, that is used to perform a particular function. Examples of common appliances are refrigerators, clothes washers and dishwashers, conventional ranges/ovens and microwave ovens, humidifiers and dehumidifiers, toasters, radios, and televisions.
Coal-Fired Plant	a power plant that uses coal as the fuel to generate electricity.
Compact Fluorescent	a lightbulb consisting of a gas-filled tube and a magnetic or electronic ballast. Electricity flows from the ballast through the gas, causing it to give off ultraviolet light. The ultraviolet light excites a white phosphor coating on the inside of the tube. This coating emits visible light. A compact fluorescent lightbulb uses less energy and produces less heat than a comparable incandescent bulb.
Current	the flow of electricity through a conductor.
Energy	the ability to do work or make a change.
Energy Conservation	saving energy through behavior changes and installing energy efficient devices.
Energy Efficiency	the ratio of the energy delivered by a machine to the energy supplied for its operation; often refers to reducing energy consumption by using technically advanced equipment without affecting the service provided.
EnergyGuide Label	the label on an appliance that shows how much energy the appliance uses in comparison to similar appliances.
Energy Star	a federal government program that recognizes the most energy efficient machines with a logo.
Flow Bag	a device that measures the rate of flow of water.
Gasket	a material used to make a joint or seal airtight.
Gauge	an instrument for or a means of measuring or testing.
Incandescent	a type of electric light in which light is produced by a filament heated by electric current. The most common example is the type you find in table and floor lamps.
Insulation	a material used to separate surfaces to prevent the transfer of electricity, heat, or sound.
Infiltrate	to pass into or through.
Kilowatt	a unit of power, used to measure electric power or consumption. A kilowatt equals 1,000 watts.
Kill A Watt Monitor	a device that measures the amount of electrical energy used by a machine.
Kilowatt-hour (kWh)	a measure of electricity defined as a unit of work or energy, measured as one kilowatt (1,000 watts) of power expended over one hour. One kWh is equivalent to 3,412 Btu.
Kinetic	the energy of motion.
Landscaping	the use of plants to modify or ornament a natural landscape.
Lumen	a measure of the amount of light produced by a bulb.

Nonrenewables	fuels that cannot to be renewed or made again in a short period of time, such as petroleum, natural gas, coal, and propane.
Payback Period	the length of time you must use a more expensive energy efficient appliance before it begins to save you money in excess of the additional upfront cost.
R-Value	a measure of a material's resistance to heat flow in units of Fahrenheit degrees x hours x square feet per Btu. The higher the R-value of a material, the greater its insulating capability.
Renewables	fuels that can be made or used again in a short period of time, such as solar, wind, biomass, geothermal, and water.
Therm	a measure of the amount of thermal energy (or heat) that can be produced by natural gas.
Thermostat	a device that controls the amount of heating and cooling produced and/or distributed.
Transmission System	an interconnected group of electric lines and associated equipment for moving or transferring electricity in bulk between points of supply and points of delivery.
Volt	a unit of measure of electric potential.
Watt	a unit of measure of electric power.
Weatherization	to make a house better protected against the effects of weather.

ADDITIONAL RESOURCES & ACTIVITIES

Change the World, take the ENERGY STAR Pledge to do your part to save energy and help fight global warming. **www.energystar.gov**

Energy Hog: www.energyhog.org
This interactive video game is full of sound effects, cartoon characters, and activities that teach about energy efficiency.

Energy Kid's Page: www.eia.doe.gov/kids
Energy Ant hosts this site containing energy facts, fun and games, classroom activities and more.

NAME

POST-SURVEY

Circle the correct answer. If you don't know the answer, leave the question blank. Don't guess.

1. The energy in petroleum, natural gas, coal, and biomass is stored as….
   a. thermal energy b. chemical energy c. kinetic energy

2. Almost half of all electricity in the U.S. is produced by….
   a. uranium b. hydropower c. coal

3. Renewable energy sources account for what percent of total energy consumption in the U.S.?
   a. 7 % b. 12 % c. 25 %

4. Electric meters in homes measure electricity use in….
   a. volts b. watts c. kilowatt-hours

5. The amount of heat energy in natural gas is measured in.…
   a. cubic centimeters b. therms c. degrees Fahrenheit

6. The average cost of a kilowatt-hour of electricity for homes in the U.S. is….
   a. $1.00 b. $0.50 c. $0.11

7. A material that slows the movement of heat is called….
   a. insulation b. conduction c. barrier

8. The biggest cost in the American home is….
   a. lighting b. controlling indoor temperature c. operating appliances

9. A device the controls temperature is called a/an ….
   a. thermometer b. insulator c. thermostat

10. Most appliances are powered by….
    a. natural gas b. electricity c. propane

11. Compact fluorescent lights are how much more energy efficient than incandescent lights?
    a. 10 – 20 % b. 25 – 50 % c. 50 – 75 %

12. Which household appliance uses the most energy?
    a. refrigerator b. television c. dishwasher

13. A water heater should be set at….
    a. 120^{O}F b. 150^{O}F c. 180^{O}F

14. Most heat escapes from a house through the…
    a. windows and doors b. walls and ceiling c. air ducts

15. The average yearly electric bill in the U.S. is….
    a. $1200 b. $2200 c. $3200

HOME ACTIVITY 11-2

INSTALLATION SURVEY

1. Did you install the compact fluorescent lightbulb (CFL) from the kit?

_____ yes What was the wattage of the bulb you replaced? _____

In what room did you install it? _____

How many hours a day (on average) is that light used? _____

_____ no Why not? _____

Do you plan to install the CFL? _____ yes _____ no

If yes, when and in which room? _____

2. Did you install the low-flow showerhead from the kit?

_____ yes Flow BEFORE _____ Flow AFTER _____ (see page 41)

_____ no Why not? _____

Do you plan to install the showerhead? _____ yes _____ no

3. Did you install the bathroom sink aerator from the kit?

_____ yes Flow BEFORE _____ Flow AFTER _____ (see page 41)

_____ no Why not? _____

Do you plan to install the bathroom aerator? _____ yes _____ no

4. Did you install the kitchen sink aerator from the kit?

_____ yes Flow BEFORE _____ Flow AFTER _____ (see page 41)

_____ no Why not? _____

Do you plan to install the kitchen aerator? _____ yes _____ no

5. Did you install the outlet and switch gaskets?

_____ yes

_____ no Why not? _____

Do you plan to install the gaskets? _____ yes _____ no

6. Did you adjust the temperature setting on the following?

Water Heater:

_____ yes Temp BEFORE _____ Temp AFTER _____

_____ no Why not? _____

Refrigerator:

_____ yes Temp BEFORE _____ Temp AFTER _____

_____ no Why not? _____

Freezer:

_____ yes Temp BEFORE _____ Temp AFTER _____

_____ no Why not? _____

7. Have you made any other changes to your home as a result of this unit (insulation, weatherstripping, etc)?

_____

HOME ACTIVITY 11-1

ENERGY USAGE SURVEY AFTER LESSONS NAME:

Let's take the survey again to see if your family has made any changes in how it uses energy.

1. Number of incandescent lightbulbs in your home. _____
2. Number of compact fluorescent lightbulbs in your home. _____
3. Number of times your dishwasher is run per week. _____
4. How often the Energy Saving feature on the dishwasher is used.

   0% 25% 50% 75% 100%

5. Number of loads of laundry washed at home per week. _____
6. Percentage of the laundry loads washed in cold water.

   0% 25% 50% 75% 100%

7. Total number of baths taken by all family members each week. _____
8. Total number of showers taken by all family members each week. _____
9. Average length of each shower. _____ minutes
10. Thermostat settings:

    Cooling Season: Day _____°F Night _____°F

    Heating Season: Day _____°F Night _____°F

11. How many times this day:

- – is a light left on in an unused room? _____
- – is a TV, radio, computer, or video game left on with no one using it? _____
- + is an outside activity, board game, or reading chosen instead of TV or video game? _____
- – is the water allowed to run needlessly when brushing teeth or scrubbing dishes? _____
- + is the microwave used to cook instead of the stove or oven? _____
- – is a door or window open when the heat or air conditioning is on? _____

HOME ACTIVITY 3-1

ENERGY USAGE SURVEY BEFORE LESSONS NAME:

BE AN ENERGY DETECTIVE: To understand how much energy is consumed in your home, you will be observing how your family uses energy. You will complete the survey twice, once before the energy lessons and again after the energy lessons. Choose a day this week and make it your first observation day. Read over the questions first and take a few moments to look around your home. If you are not sure about a question, ask an adult for help.

1. Number of incandescent lightbulbs in your home. _____
2. Number of compact fluorescent lightbulbs in your home. _____
3. Number of times your dishwasher is run per week. _____
4. How often the Energy Saving feature on the dishwasher is used.

   0% 25% 50% 75% 100%

5. Number of loads of laundry washed at home per week. _____
6. Percentage of the laundry loads washed in cold water.

   0% 25% 50% 75% 100%

7. Total number of baths taken by all family members each week. _____
8. Total number of showers taken by all family members each week. _____
9. Average length of each shower. _____ minutes
10. Thermostat settings:

    Cooling Season: Day _____°F Night _____°F

    Heating Season: Day _____°F Night _____°F

11. How many times today:

- – is a light left on in an unused room? _____
- – is a TV, radio, computer, or video game left on with no one using it? _____
- \+ is an outside activity, board game, or reading chosen instead of TV or video game? _____
- – is the water allowed to run needlessly when brushing teeth or scrubbing dishes? _____
- \+ is the microwave used to cook instead of the stove or oven? _____
- – is a door or window open when the heat or air conditioning is on? _____

NAME

PRE-SURVEY

Circle the correct answer. If you don't know the answer, leave the question blank. Don't guess.

1. The energy in petroleum, natural gas, coal, and biomass is stored as….
   a. thermal energy b. chemical energy c. kinetic energy

2. Almost half of all electricity in the U.S. is produced by….
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National Association of State Universities and Land Grant Colleges
National Hydropower Association
National Ocean Industries Association
National Renewable Energy Laboratory
Nebraska Public Power District
New Jersey Department of Environmental Protection
New York Power Authority
New Mexico Oil Corporation
New Mexico Landman's Association
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